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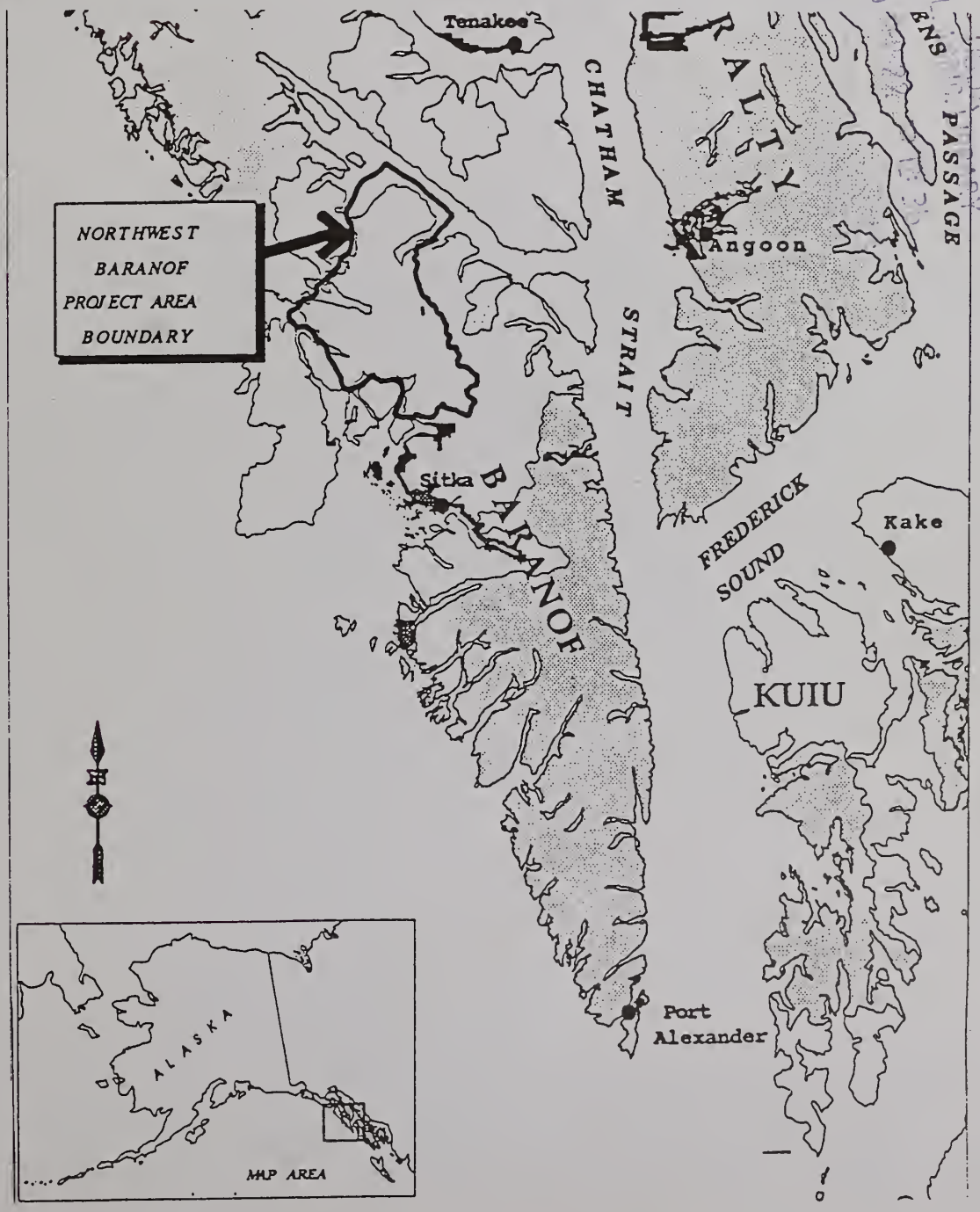
Northwest Baranof Timber Sale(s)

Draft Environmental Impact Statement

Volume I



Common Abbreviations

BMP	Best Management Practice
CFL	commercial forest land
CFR	Code of Federal Regulations
COE	Army Corps of Engineers
CZMA	Coastal Zone Management Act of 1976
EIS	Environmental Impact Statement
FSH	Forest Service Handbook
GIS	Geographic Information System
HILTS	Helicopter Insertion Log Transfer Site
IDT	Interdisciplinary Team
LTF	log transfer facility
LUD	land use designation
mbf	thousand board feet
mmbf	million board feet
NEPA	National Environmental Policy Act of 1969 (as amended)
ORV	off-road vehicle
ROD	Record of Decision
TLMP	Tongass Land Management Plan
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
VCU	value comparison unit

Northwest Baranof Timber Sale(s)

Draft Environmental Impact Statement

U.S.D.A. Forest Service, Alaska Region

Tongass National Forest, Chatham Area

Sitka Ranger District

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Abstract: The U.S. Forest Service proposes five alternatives for making timber volume available: (1) to disperse timber harvest throughout the Project Area; (2) to concentrate timber harvest in three areas that have had previous logging activity; (3) to concentrate timber harvest in the north end of the Project Area; (4) to distribute timber harvest throughout the Project Area and provide a high level of timber; and (5) No Action.

Reviewers should provide the Forest Service with their comments during the review period of the Draft Environmental Impact Statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the Final Environmental Impact Statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewer's position and contentions. *Vermont Yankee Nuclear Power Corp. v NRDC*, 435 U.S. 519, 553 (1977). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the Final Environmental Impact Statement. *City of Angoon v Hodel* (9th Circuit, 1986) and *Wisconsin Heritages, Inc. v Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the Draft Environmental Impact Statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

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Chapter 1
Purpose and Need

Chapter 1
Purpose and Need

Project Overview

In compliance with Federal regulations, the USDA Forest Service has prepared this Draft Environmental Impact Statement (EIS) for proposed timber harvest and related activities in the Northwest Baranof Project Area. The Northwest Baranof Project Area is located on the Sitka Ranger District of the Chatham Area, Tongass National Forest (See Figure 1-1).

This EIS follows the format established in the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508). In this document, we disclose the physical, biological, economic, and social consequences of five alternatives, including the no-action alternative.

There are four chapters in this EIS (see Table 1-1). A Summary of Chapters 1 through 4 is available as a separate document. Supporting materials are included in the Appendices, and additional documentation is filed in the project planning record at the Forest Supervisor's Office in Sitka.

Table 1-1
How This EIS is Organized

Chapter 1 **Purpose and Need**	The purpose and need for the project, decision to be made, background information, public issues, and other considerations.
Chapter 2 **Alternatives**	The presentation and comparison of alternatives, with information on their environmental impacts and how they would be implemented with measures to protect our environment.
Chapter 3 **Affected Environment**	A description of the existing condition of the environment that may be affected by the alternatives under consideration.
Chapter 4 **Environmental Consequences**	Environmental changes likely to occur with the implementation of the alternatives.
Alternative Maps	Maps for each alternative considered in detail which illustrate proposed units and roads, and display other geographic features of the Project Area.
Appendices	Supporting information.

1 Purpose and Need

Purpose of and Need

The purpose and need for the Northwest Baranof Project is to implement direction contained in the Tongass Land Management Plan (TLMP), as amended (USDA Forest Service 1979, 1986), to help provide a sustained level of timber supply to meet annual and TLMP planning cycle market demand, and to provide local employment in the wood products industry, consistent with providing for the multiple use and sustained yield of all renewable forest resources. The Northwest Baranof Project is expected to provide between 30 and 100 mmbf of timber, given the guidance in the TLMP.

The TLMP currently provides for management of about 38 percent of the Project Area for intensive resource use and development with an emphasis on commodity resources such as timber. Under TLMP, this 38 percent has been given land use designation (LUD) IV. The TLMP provides for management of the other 62 percent of the Project Area for a variety of uses, including timber production (LUD III). The TLMP schedules timber sale preparation for all Management Areas in the Project Area. A comparison of the Desired Future Condition for the Project Area, as reflected in TLMP direction, with the existing condition shows the need to convert suitable stands of old growth timber to managed productive stands capable of long-term timber production.

Section 101 of the Tongass Timber Reform Act of 1990 (TTRA), directs the USDA Forest Service ". . . to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources, seek to provide a supply of timber from the Tongass National Forest which (1) meets the annual market demand for timber from such forest and (2) meets the market demand from such forest for each planning cycle." Section 101 of the TTRA specifies that Forest Service efforts to seek to meet market demand are subject to appropriations, National Forest Management Act (NFMA) requirements, and other applicable law. Providing a timber supply from the Tongass for sustained local wood products industry employment and related economic and social benefits is an objective of the TLMP, the Alaska National Interest Lands Conservation Act (ANILCA), as amended by the TTRA, and the Ketchikan Pulp Company (KPC) long-term contract.

Two indicators of market demand are used here in further defining the need. First, the price of bids for timber in the region remains high. Independent sales continue to sell for more than the appraised value. This reflects the nationwide and world price and demand for timber. Second, there is a demonstrated mill capacity in the region to process the logs, if the supply of timber is available. There is also a projected need for the timber volume being considered from this project area for the Forest Service to come closer to meeting an objective of providing a three year supply of timber under contract to the existing dependent industry, as a means of providing for stability in relation to fluctuating market demand (Morse 1995). There is a substantial component of the economy of Southeast Alaska that is dependent on a viable timber industry. Based on these factors, the need for the project is clearly indicated.

At this time, the timber volume from this project is currently scheduled to be made available to the independent timber sale program and not to KPC. Any KPC long-term contract offerings implemented through this Project will help meet KPC long-term contract timber supply needs. The KPC timber sale contract (USDA Forest Service. 1951. Contract Number A10fs-1042), includes the following provisions:

B0.61 Timber Offering Schedule. Each year prior to February 15, Forest Service after consultation with purchaser shall develop a tentative Offering schedule based upon the Tongass National Forest Land and Resource Management Plan, which shall display Offering Areas and timber volumes proposed for harvest, and the expected NEPA process commencement and completion date for making any additional Offerings under the terms of this contract. To the extent authorized by law, Offering Areas may be identified for harvest outside the Sale Area, as needed to meet sale volume requirements. The tentative schedule shall list sufficient timber volume and schedule commencement of the NEPA process by Offering Area or Areas to provide Purchaser a Current Timber Supply sufficient for at least three years of operations hereunder or until the contract termination date, whichever occurs first, adjusting for the provisions of B0.63 and B6.36. In developing the schedule, Forest Service will consider the production requirements of Purchaser's manufacturing facilities.

B0.62 Specifying Offerings for Harvest. Based upon the tentative schedule and NEPA process, and consistent with timber sale planning, management requirements, and environmental assessment procedures for independent Tongass National Forest timber sales, Forest Service after consultation with Purchaser and completion of the NEPA process, shall specify and additional Offerings. Forest Service shall seek to specify sufficient Offerings to maintain a Current Timber Supply in all Offering Areas that totals at least three years of operations hereunder or until the contract termination date, whichever occurs first, and which meets the production requirements of Purchaser's manufacturing facilities.

The maximum average annual rate per year at which KPC is generally allowed to harvest is 192.5 MMBF under long term contract section B0.52. KPC's average harvest rate, obtained from contract records, during the five-year period from March 1, 1989 through February 28, 1994 was 185.4 MMBF per year. Therefore, a three year supply of timber for KPC's operations under the contract is currently estimated to range from 556.2 to 577.5 MMBF.

As of June 1, 1995, KPC had a current timber supply of approximately 193 MMBF. The maximum volume of timber that can be provided to KPC from within the contract area in the remainder of fiscal year 1995 is about 93 MMBF. The maximum amount that can be provided to KPC from within the contract area during 1996 is expected to be about 174.1 and during 1997 about 155.9 MMBF. Assuming the maximum annual average harvest rate of 192.5 MMBF, a timber supply of 93.5 MMBF would be available at the end of 1995, 75.1 MMBF at the end of 1996, and 38.5 MMBF at the end of 1997. These levels would fall well short of meeting the objective of specifying a three-year supply for operations under the contract, considering on-going harvest at either the maximum or historic rates noted above.

There have been suggestions that layout and other actions could be expedited to increase the amounts available from the contract area through 1997. However the current assessment is that further expediting layout is not feasible, even with significant increased funding, while maintaining a reasonable assurance of quality work. The Forest Service has made efforts to accelerate the preparation of new offerings within the contract area. At present, about 852.7 MMBF in new timber projects are being planned within the contract area over the duration of the contract, beyond what is projected in the 1995 -

1997 figures presented above. However, because of the amount of time required to prepare new offerings in accordance with applicable laws, none of this volume is projected to be available until after fiscal year 1997. It remains to be seen how much of the volume in preparation will be cleared through the NEPA process and when it will be available.

Consequently, additional timber from outside the KPC contract area is needed in order to meet the three-year timber supply objective. Sale offerings currently scheduled, undergoing NEPA evaluation, or at some other stage in the preparation process are projected to be needed to help meet the KPC long-term contract and independent sale program's three-year supply objectives. If any currently planned independent sales were converted to KPC contract offerings, equivalent volume currently planned for KPC contract offerings would then need to be substituted as independent sale offerings. The first offerings from the Northwest Baranof Project Area could be made available in 1996 to help meet either three-year supply objective.

Decision to be Made and Responsible Official

The Council on Environmental Quality (CEQ) regulations state that an EIS ". . . should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision-maker. . . ." As a result, this EIS is not a decision document but is written to provide sufficient information for the decision-maker.

The Chatham Area Forest Supervisor is the responsible official for this Project. He must decide whether or not to make timber available from the Northwest Baranof Project Area in accordance with implementation of the TLMP. Furthermore, if he selects an alternative which proposes timber harvest, he must decide:

- the volume of timber to make available in this area in one or more timber sales
- the location of timber harvest units
- the location of road systems
- the location of log transfer facilities (LTFs)
- mitigation measures and enhancement opportunities for sound resource management, and
- whether there may be a significant restriction on subsistence uses

The decision will be documented in the Record of Decision (ROD) expected January 1996.

Project Area

The Northwest Baranof Project Area is located in the Tongass National Forest at the northwest end of Baranof Island. It lies approximately five miles north of Sitka, Alaska and encompasses 156,003 acres. The Project Area includes the major watersheds of Rodman Creek, Fish Bay Creek, and Nakwasina River. It also includes the lands on Baranof Island bordered by Nakwasina Sound, Nakwasina Passage, Neva Strait, and Peril Strait (Figure 1-1).

Background

The Project Area was, until recently, part of the Alaska Pulp Corporation (APC) long-term timber sale contract area. In 1956, the Forest Service entered into a contract with the Alaska Lumber and Pulp Company (later renamed Alaska Pulp Corporation) for the sale and harvest of timber in Southeast Alaska for a 50-year period beginning in 1961 and ending in 2011. On September 30, 1993, APC ceased operation of its Sitka pulp mill, whereupon the Forest Service officially terminated the long-term timber sale contract with APC on April 14, 1994. Termination of the APC contract shifted the focus for making timber available in the Project Area from APC long-term timber sale contract offerings to competitive independent timber sales. Since the termination of the APC contract, the Forest Service has continued to assess market demand for timber in Southeast Alaska as part of its independent timber sale program. This market assessment continues to affirm market demand for timber volume in Southeast Alaska.

In addition to the independent timber sale program, the termination of the APC long-term contract has also resulted in timber that was previously committed to the APC contract being available for Ketchikan Pulp Company (KPC) under it's long-term contract. KPC operates a pulp mill and a sawmill in Ketchikan and a sawmill in Metlakatla. The KPC operation was a result of a 50-year contract between the Forest Service and KPC for sale and harvest of timber in Southeast Alaska beginning in 1954 and ending in 2004.

In 1994, the scheduling of a number of timber sale projects was adjusted in order to maintain options for addressing new resource management issues. The Forest Service updated KPC's long-term contract tentative offering schedule to reflect ending issues concerning wildlife species viability and potential species listing under the Endangered Species Act. Some of the original volume scheduled for the Alaska Pulp Corporation long-term contract is now being scheduled for the KPC contract. The Forest Service projects that offerings to KPC scheduled in 1994 and 1995 from the Stikine and Chatham Areas will be needed to help meet sale volume requirements.

1 Purpose and Need

Figure 1-1
Vicinity Map

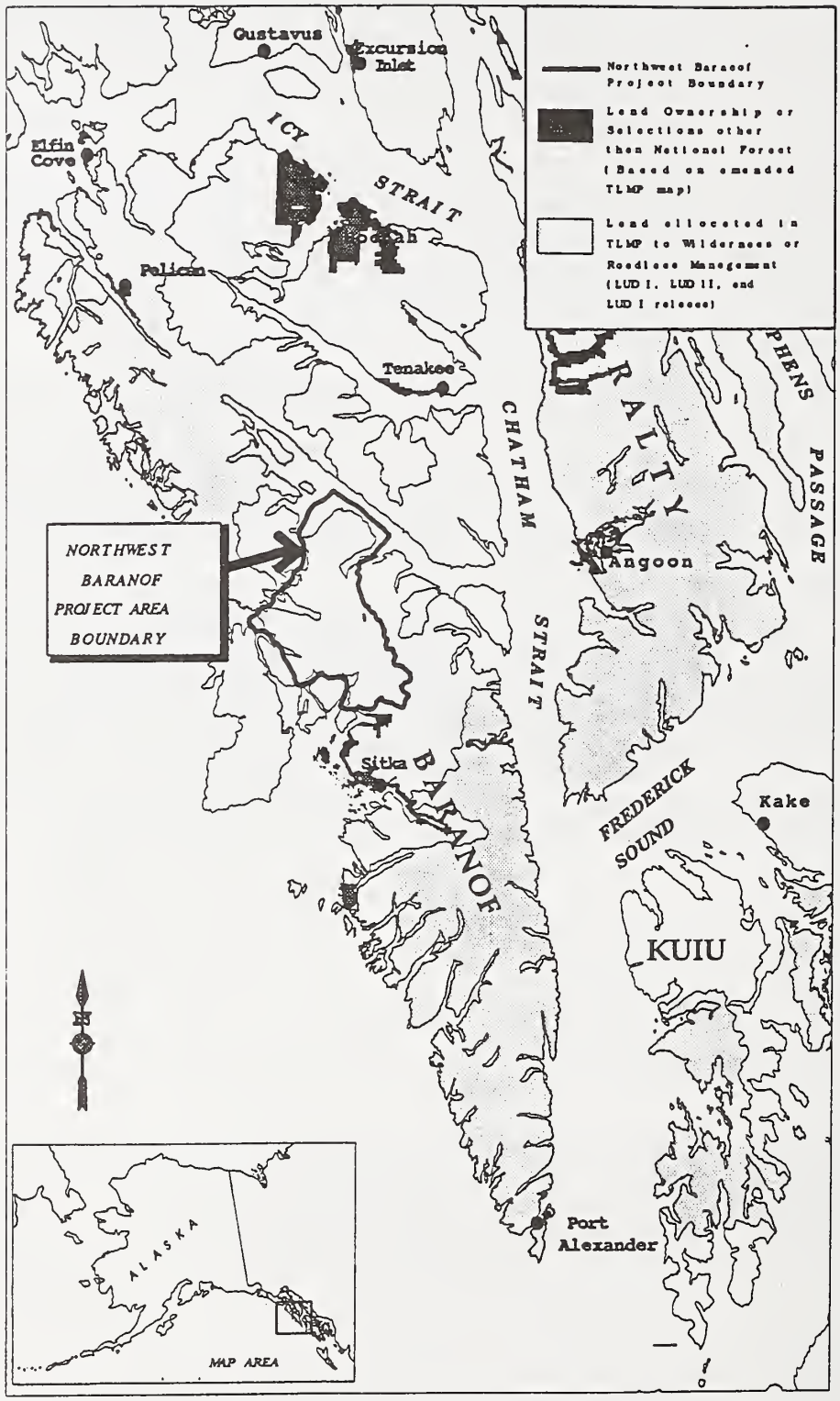

Figure 1-2
Map of VCUs

1 Purpose and Need

Relationship of This Project to The Tongass Land Management Plan (TLMP)

The National Forest Management Act of 1976 (NFMA) directs each National Forest to prepare a land management plan. The Tongass Land Management Plan (TLMP) was completed in 1979 to guide management of the Tongass National Forest and amended in 1986. The TLMP is currently undergoing revision as mandated by the NFMA. Until a new Record of Decision (ROD) is signed and the revised plan is implemented, the TLMP (1979, as amended) remains in effect. In addition to the TLMP, the Alaska Regional Guide (1983) addresses regional issues specific to Alaska, establishes management standards and guidelines, and displays resource outputs for the Tongass National Forest.

We developed the Northwest Baranof Project to implement management direction contained in the TLMP. Each of the alternatives considered in detail for this project is consistent with the current TLMP. The TLMP includes ten goals which described the desired condition to be achieved through implementation of the Plan. One of these states that "the goal is to make enough timber available from National Forest lands to maintain current levels of timber related employment...."

The TLMP established land use designations (LUDs) to guide management of the land for certain uses. The LUDs describe activities that may be authorized as part of the management of a given area. The LUDs are assigned to areas known as value comparison units (VCUs), which are roughly equivalent to large watersheds. The boundaries of a VCU usually follow easily recognizable watershed divides. In some cases, an island or a group of small islands form a single VCU. Figure 1-2 displays the Project Area's VCUs (Forest Service 1979). The TLMP also formed management areas of one or more contiguous VCUs and developed direction for each management area.

Land Use Designations (LUDs)

Amenities are resources that are pleasing to the mind or senses. Amenity uses or values cannot be easily measured in dollars.
Commodities are resources that have a dollar or market value. Timber and minerals are examples of commodity values.

The TLMP allocates each of the ten VCUs within the Northwest Baranof Project Area to LUD III or LUD IV,. Each of these LUDs are described below:

Land Use Designation III

Purpose - Areas allocated to LUD III are to be managed for a variety of uses. The emphasis is on managing for both amenity and commodity oriented uses in a compatible manner to provide the greatest combination of benefits. These areas usually have high amenity values in conjunction with high commodity values. Within the Project Area, VCUs 287-290, and 300-302 are allocated to LUD III.

Management Implications - Potential timber yields will be reduced to the extent needed to protect important biological and aesthetic values. Both permanent and temporary roads are allowed. Roads are located and designed to retain important recreational and scenic qualities. Needed trails can be provided and a full range of recreational facilities is permissible. A full range of fisheries improvement projects is permitted.

Land Use Designation IV

Purpose - Areas allocated to LUD IV provide opportunities for intensive development of resources. Emphasis is primarily on commodity, or market resources and their use. Amenity values are also provided for. When conflicts over competing resource uses arise, conflicts would most often be resolved in favor of commodity values. Within the Project Area, VCUs 291, 292, and 299 are allocated to LUD IV.

Management Implications - Potential timber yields will be reduced to the extent necessary to protect key biological and aesthetic values. Both permanent and temporary roads are allowed and motorized use is permitted. Needed trails can be provided and a full range of recreational facilities is permitted. A full range of fisheries improvement projects is permitted.

Management Area Direction

The Northwest Baranof Project Area includes portions of two Management Areas (C40 and C41)Figure 1-3. TLMP provides a management direction/emphasis statement for each Management Area. This direction provides information about conditions and intents we should consider in planning for the Management Area. Management Direction for Management Areas C40 and C41 is described below:

Management Areas C40 and C41

Management Direction/Emphasis - Timber sales will continue to be prepared and offered. Timber stand improvement activities will continue in previously harvested areas. Wildlife habitat improvement opportunities for Sitka black-tailed deer will be emphasized in conjunction with timber stand improvement activities. Opportunities for fishery habitat enhancement include bridge and culvert removal on old road systems. Debris management for fish habitat will be pursued. The reconstruction of Fish Bay Trail No. 477 to the Fish Bay Hot Springs will be studied along with the potential development of a recreation facility at the hot springs (Forest Service, 1979).

How the Northwest Baranof Project Area was Selected

Prior to scheduling the Northwest Baranof Project Area for environmental analysis, the Forest Service analyzed all LUD III and LUD IV lands on the Chatham Area and divided the LUDs into approximately 50 geographical areas. The 50 geographical areas were then grouped into approximately 18 potential project areas for which timber harvest activities could be proposed and environmental analysis completed. The potential project areas were identified based on common geographic features, past harvesting activity, pending legislative action, and estimated available volumes of timber.

The Chatham Area Forest Supervisor selected the Northwest Baranof Project Area for environmental analysis because the Northwest Baranof Project Area contains a sufficient amount of harvestable timber volume on lands designated as LUD III or IV, and therefore harvest is appropriate under the TLMP (1979, as amended). Available information indicates that harvest of the amount of timber being considered for this project can occur consistent with the TLMP, standards and guidelines, and other requirements for resource protection.

1 Purpose and Need

Scope of the Project

National Forest planning is accomplished at two levels: the program level and the project level. The program level includes Forest Plans, Regional Guides, and other multi-Forest or Regional analysis. The project level includes site specific analysis such as timber sales and facility construction projects.

Project level planning is focused on implementation of management direction provided by program level decisions. For example, in the case of the Northwest Baranof Project the management direction is provided by TLMP and the Alaska Regional Guide.

The Northwest Baranof Project is a project level analysis designed to implement management direction contained in the TLMP, as amended. As a result, the scope of this EIS is limited to project specific issues, actions, alternatives, and impacts. We will not attempt to address or analyze decisions or issues associated with higher level planning and direction such as the TLMP or the Alaska Regional Guide.

Desired Condition

The desired conditions described here are written as if they already exist. This is what we want to be saying about the Northwest Baranof Project Area 50 years from now.

The implementation of a Forest Plan begins with an identification of both the existing condition and the desired condition of the National Forest within a project area. The next step is to compare the existing condition to the desired condition and to identify opportunities for change. This leads to the development of a purpose and need for the project.

Desired condition is a component of ecosystem management (see discussion of ecosystem management in Chapter 2). We are asked to focus management actions to achieve desired current and future conditions of the land, always seeking to balance goals for the land with goals for the people (Robertson, June 4, 1992). We can use desired conditions as a basis for decisions which provide for all species rather than focusing on the means to get there, or on a single species (Robertson, June 25, 1992).

The existing condition of the Northwest Baranof Project Area is described in Chapter 3 of this EIS, "Affected Environment." The desired condition for the Northwest Baranof Project Area as described here in this chapter, is based on management direction contained in the TLMP, as amended, and in the Alaska Regional Guide. This desired condition is a vision of what the landscape will be like in the future. It describes the physical, biological, economic, and social characteristics of the Project Area approximately 50 years from now. We developed desired condition statements for all major physical, biological, and human resources within or dependent on the Project Area. We designed these statements at a scale to be specific enough to meet Forest Plan direction, but flexible enough to provide some space for future management decisions.

The overall desired condition for the Northwest Baranof Project Area is a long-term, beneficial interaction between people, their needs, and the environment. Ecological systems are sustained and manipulated to provide for long-term human needs. These needs include the traditional harvest of fish, wildlife, and other subsistence resources; the continued harvest of trees for a variety of wood products; and the opportunity for a quality scenic and recreational experience.

The desired condition for the Northwest Baranof Project Area is described in three parts, the physical and biological environment, the on-site human environment, and the off-site human environment. In each case, we describe how the Project Area and the affected environment will look in approximately 50 years.

Physical and Biological Environment

Geology, Topography, Climate, Soil, and Water - The ecological condition and processes within the Northwest Baranof Project Area are dominated by geology, topography, and climate. The rugged and steep topography, low temperatures, and high rainfall strongly influence soils, water, and vegetation. The maintenance of soil productivity and stability, and the protection of water quality and fish habitat continue to be a primary consideration for management of the Project Area. Although management activities in the area may have small, isolated, short-term negative impacts on soils and water, cumulative and long-term effects are limited.

Vegetation - The vegetation of the Northwest Baranof Project Area is a mosaic of forest and nonforest plant associations. This includes managed and unmanaged timber stands and diverse forest age structures. This mosaic is similar to what has existed since timber was first harvested in the mid-twentieth century, with coniferous forests interspersed with nonforest plant communities including alpine, muskeg, shrubland, and estuaries . There are areas which are maintained in their natural state with natural ecological processes the dominant agent of change. There are also areas where timber harvests occur that result in both even and uneven aged stands. Finally there are areas with maturing, second-growth forests which are a result of clearcutting and overstory removal that has taken place.

Fish and Wildlife - Within the Northwest Baranof Project Area, wildlife habitat diversity has not changed substantially for 50 years. Because of this, the number of wildlife species in the area are the same, although the size of individual populations may fluctuate from year to year. Monitoring of fish and wildlife populations and habitats continues to assess population viability and wildlife diversity. Cooperation between state and federal agencies are maintained in order to ensure comprehensive management strategies.

Marine Environment - Surrounding the Northwest Baranof Project Area lies an environment that is both highly productive and important to the people who live in or visit Southeast Alaska. This marine environment includes the saltwater and intertidal areas and is cooperatively managed with the State of Alaska and other federal agencies. The protection of marine resources continues to be a high priority for all management agencies. Although development does take place within the marine environment, any impacts are minimal.

On-site Human Environment

The desired conditions described here are written as if they already exist. This is what we want to be saying about the Northwest Baranof Project Area 50 years from now.

Silviculture and Timber Management - The majority of the Project Area is managed for a variety of uses, with the emphasis on managing for both amenity and commodity oriented uses in a compatible manner. As a result, potential timber yields are reduced to protect important biological and social values. Timber harvest activities include both even-aged and uneven-aged silvicultural systems. Along the Alaska Marine Highway System ferry route, scenic values are important and timber management reflects those values. Silvicultural prescriptions recognize the effects of color, tone, texture, line, slope, size, and edge on scenic values. Elsewhere in the Project Area, silvicultural prescriptions are developed that meet scenic, vegetative, wildlife, and timber objectives.

Within the three VCUs allocated to LUD IV(VCUs 291, 292, and 299), there are opportunities for intensive development of resources. Here emphasis is primarily on timber production along with the necessary mitigation measures to protect key biological and aesthetic values.

Hunting, Fishing, and Subsistence - The use of the Northwest Baranof Project Area for hunting, fishing, and subsistence continues to play an important role in management for the area. Maintenance of some logging roads for ongoing small scale logging operations permits greater access to the interior of the Project Area. This, in turn, disperses hunting, fishing, and subsistence use to some extent. Much of the Project Area continues to be managed in a near natural state with corresponding hunting, fishing, and subsistence opportunities and experiences. The remainder of the area is managed for short term activities, such as timber harvests, and then access is eliminated or reduced. This does not change long-term hunting, fishing, or subsistence use patterns. Hunting and fishing success and the availability of subsistence resources remains relatively constant over time with only periodic short-term fluctuations.

Recreation and Scenic Quality - The recreation opportunities and the scenic quality of the Northwest Baranof Project Area has increased in importance over the last 50 years. Access for recreation is by boat and floatplane. Most of the area is managed for dispersed recreation, with access to the interior by a combination of foot and off-road vehicle (ORV) travel. The scenic quality of the area is important, as marine-based tourism increases. The area forms a scenic backdrop for views from the Alaska Marine Highway System ferries and small cruise ships that travel the Inside Passage and Peril Strait. It also provides a recreation setting for thousands of marine travelers and other recreationists along the straits and bays that border the area. Some of these travelers anchor and go ashore; others appreciate the scenic quality as they pass by the Project Area.

Heritage Resources - Opportunities to identify, evaluate, preserve, protect, and interpret heritage resources in the Northwest Baranof Project Area have increased. Working with local Native organizations and governments, the State of Alaska, other federal agencies, and interested groups and individuals, the Forest Service has developed a better understanding of the history of the Project Area. In cooperation with interested groups like the Sitka Tribe of Alaska (STA), the Forest Service has identified significant cultural properties. Site are interpreted, and the Forest Service shares responsibility in promoting awareness of the local heritage.

Lands - Cooperation with other land owners, other governments, and people using the National Forests has resulted in a large increase in the number of permits, agreements, and cooperative activities. These agreements and activities not only meet the needs of the public, but also meet the intent of the management direction for affected areas within the Project Area.

Transportation System - Access both to and within the Northwest Baranof Project Area has not changed significantly in 50 years. Access is primarily by saltwater with access to the interior by foot and ORV travel. There is short-term access to the interior as a result of management activities within the Project Area. For example, in areas where timber harvest activities are taking place, temporary or short-term roads may be constructed and maintained. If subsequent activities are scheduled for an area, permanent roads may be constructed and maintained. In addition, road management objectives for the area include roads closed to motor vehicle travel and roads managed for recreational ORV use.

Facilities - The facilities provided within the Northwest Baranof Project Area, both for management activities and for visitors, have increased over 50 years. The number and variety of recreation facilities have seen the greatest increase. Emergency shelters have been constructed in remote coastal locations. There are additional recreation cabins along the coast and within the interior of the Project Area. These cabins are located in areas of scenic and recreational value, and are associated with other recreational activities such as fishing, hunting, and hiking. Recreational trails have been constructed and are maintained within the Project Area. Other facilities within the Project Area are short-term in duration and associated with specific management activities, for example, log transfer facilities, logging camps, and administrative cabins.

Off-site Human Environment

Southeast Alaska Economics - The Northwest Baranof Project Area continues to contribute positively to the economy of Southeast Alaska. It provides resources for three major industries in the region: timber and wood products, commercial fishing and seafood processing, and recreation and tourism. Each of these industries, although changed over time, still has a major impact on the economy of Southeast Alaska.

Sitka Economics - The Northwest Baranof Project Area continues to contribute substantially to the economy of Sitka. The land and the waterways between Sitka and Chatham Strait have become increasingly important over time as a resource base for local components of the three major industries: timber and wood products, commercial fishing and seafood processing, and recreation and tourism. In addition, Peril Strait, Neva Strait, and Olga Strait continue to be a major transportation corridor leading to Sitka.

The commercial fishing and seafood processing industry as well as the recreation and tourism industry continue to thrive in Sitka, and some components have seen substantial growth. Employment, income, and local revenues from these two industries are a large contributor to the local economy. The timber and wood processing industry, on the other hand, has been transformed into one where the timber resources of the Northwest Baranof Project Area will be used primarily (but not solely) in Sitka for lumber, firewood, and locally processed wood products.

The desired conditions described here are written as if they already exist. This is what we want to be saying about the Northwest Baranof Project Area 50 years from now.

Personal Economics - The resources of the Northwest Baranof Project Area continues to provide opportunities for individuals to derive employment and personal income. This includes opportunities for employment in timber and seafood harvesting, and/or in the recreation and tourism industry. Furthermore, the close proximity to Sitka provides many residents the opportunity to pursue traditional subsistence activities. As a result, the personal income (both monetary and non-monetary) of the residents of Sitka continues to be well above the national average.

Community Values - Although there have been many changes in Sitka during the past 50 years, most of the characteristics and values of the community have remained the same. A major factor in this stability is the relative isolated nature of the community. Sitka is still accessed exclusively by aircraft or boat.

This relative degree of remoteness, combined with the considerable scenic and recreational opportunities and the availability of abundant natural resources, continues to be a major influence on Sitka and its residents. Residents still agree that the quality of life outweighs the disadvantages of seasonal employment, cost of importing goods and services, limited access, and rainy weather. These characteristics and values continue to play a major role in the cohesion and stability exhibited by the community of Sitka.

Public Involvement

The National Environmental Policy Act of 1969 (as amended) (NEPA) requires agencies to encourage and facilitate public involvement in decisions which affect the quality of the human environment. To that purpose, we have made a diligent effort to involve the public in the Northwest Baranof Project. This has included legal notices, scoping documents, display ads in the local newspaper, public meetings, and other formal and informal public contacts. We continue that effort with the release of this Draft EIS, the subsequent public comment period, and the subsistence hearings.

The NEPA also states that there shall be an early and open process for determining the scope of issues to be addressed and for determining the significant issues related to the proposed action. It refers to this process as "scoping." We published notices of our intent to initiate the project in the *Daily Sitka Sentinel* and the Federal Register. We published and distributed documents describing the project during two scoping periods. We held public meetings in Sitka and Angoon during scoping and solicited information from the public. During this scoping process we invited the participation of affected Federal, State, and local agencies, federally recognized Indian Tribes, and other interested groups and individuals. A major component of the scoping process was to determine the significant issues to analyze in depth in the environmental impact statement. These issues are described in the following section. We encouraged interested members of the public to contact us if they had any questions about the project or the planning process.

After scoping was completed, a group formed in Sitka that expressed opposition to clearcutting in the vicinity of Sitka. This group is called Friends of Southeast's Future. They have circulated a petition, met with the City and Borough Assembly, and held public meetings. The Forest Service has also met both informally and formally with members of this group.

Appendix B contains details of the public involvement process for Northwest Baranof.

Contacts with the Sitka Tribe of Alaska

On May 15, 1992, the Forest Service and the Sitka Tribe of Alaska (STA) entered into a Memorandum of Understanding (MOU) "...to establish a framework for cooperative relationships between the Forest Service and the Sitka Tribe of Alaska for carrying out the unique relationship and obligations the United States Government has with Indian Tribal Governments. This shall serve as a vehicle through which the Forest Service maintains a legal and political relationship with the local tribal government in Sitka." In keeping with the spirit of this MOU, the ID Team has made a diligent effort to maintain and strengthen the Forest Service's working relationship with STA throughout planning for this Project. A partial list of contacts with STA is included in Appendix B.

Issues To Be Addressed

The NEPA requires federal agencies to determine the scope of the issues to be addressed and to identify the significant issues related to the proposed action. For the Northwest Baranof Project, these issues were identified through the scoping process described in the previous section. Issues were raised by the public, which included individuals; organizations; other Federal, State, and local agencies; and affected Indian Tribes. Some of these issues were identified through scoping within the Forest Service and relate to concerns about specific resources and legal requirements.

We analyzed the issues raised during scoping and grouped similar issues when appropriate. We determined the following issues to be significant and within the scope of the project. In formulating alternatives we considered each of the issues and addressed them in some manner in all alternatives. We considered one issue but eliminated it from detailed study because resolution falls outside the scope of the Northwest Baranof Project (see page 16).

Fish Habitat and Water Quality

The fisheries resource on the Tongass National Forest contributes significantly to the economic, recreational, and subsistence needs of Southeast Alaska residents. Streamside habitat provides important shelter, hiding places, food, and rearing areas for salmon. Changes in streamside habitat due to logging or road construction could alter a stream's ability to produce fish.

Past logging may have adversely affected fish habitat in some rivers and streams north of Sitka. The streams within the Project Area support many salmon. Maintaining, enhancing, and rehabilitating fish habitat is an important concern for many Sitka residents.

Wildlife Habitat and Populations

The Project Area supports a wide variety of wildlife species. Two species of particular concern are Sitka black-tailed deer and mountain goat. Sustainable populations of deer are important to the quality of life of many Sitka residents. The maintenance of adequate deer winter range is critical for survival of deer populations. Logging may reduce available winter habitat for deer and, as a result, may contribute to reduced deer populations in some areas over the long term.

Access to goat winter range at the headwaters of Noxon Creek afforded by additional road construction could cause increased hunting pressure on this herd of goats.

Old Growth

Old-growth forests are valuable because of their biological diversity, wildlife habitat, recreation opportunities, scenic quality, soil productivity, and water quality. These forests are also a source of high quality timber. Balancing these important but conflicting values of old growth is an important and difficult planning problem.

The term fragmentation describes the size and distribution of isolated old-growth forest tracts caused by natural conditions or logging activities. The size of old-growth patches,

and corridors that connect old-growth patches, are important in managing wildlife habitats and for biological diversity. Old-growth fragmentation due to road construction and logging is a concern.

Marine Environment

Marine fish and shellfish productivity may be affected by the location and design of log transfer facilities (LTFs) and log storage areas, and by bark accumulations that may occur as a result of their use. A specific concern is the proposed LTF in St. John Baptist Bay which could affect the sable fishery there. In addition, the proposed LTFs in Nakwasina Passage and Sound may adversely affect crabbing in that area.

Marine mammal populations may be affected by the location of LTFs and the activity associated with logging and log transportation. For example, a seal haul-out near the proposed LTF at Noxon Creek may be affected.

Subsistence

Maintaining subsistence opportunities on Baranof Island is of concern to many rural residents. This area is used for hunting, trapping, fishing, and gathering. Subsistence foods supplements the diets of many people. The Native American lifestyle in Southeast Alaska is dependent upon subsistence resources for the preservation of cultural customs and traditions. The subsistence lifestyle reflects deeply-held values, attitudes, and beliefs of both Native and non-Native people.

The location and size of logging camps, and the length of time they are in use, are of concern because of increased competition for subsistence resources. In addition, access provided by logging roads may increase competition with Sitka residents for hunting, trapping, fishing, and gathering above existing levels.

Recreation

Outdoor recreation opportunities are important to the quality of life for many Southeast Alaska residents. Dense rain forests, abundant fish and wildlife, and miles of protected waterway combined with the vast and remote character of the area, provide a unique setting for quality recreation experiences. Logging, road construction, and related activities will alter some recreational settings over the short-term and/or long-term.

The lack of roads and the necessity for access from saltwater provide a unique recreational setting appreciated by visitors and residents alike. A difficult terrain, dense vegetation, and limited anchorages confine many recreational activities to accessible shorelines. LTFs, log storage, and logging camps located in these popular areas may displace recreational use during logging. Popular areas that could be affected include Schulze Cove, St. John Baptist Bay, and Nakwasina Passage.

Road construction and reconstruction have the potential for opening new areas for road related recreation. Management objectives of roads after logging will determine if access is short term or long term. Although some people desire additional motorized recreational opportunities, others may oppose opening more areas to motorized use.

Scenic Quality

Marine Highway travelers view dense spruce and hemlock rain forests, abundant fish and wildlife, rugged mountains, secluded fjords and bays, and miles of protected waterways. The unique natural setting and outstanding scenery are an important component of the visitor's experience. Tourism has helped diversify the economy of Sitka, and maintaining the scenic quality of the landscape is of concern to both visitors and the community. Timber harvest has the potential for affecting the scenery along the marine highway.

Many people have chosen to live in or visit Sitka because of the opportunity to work or play in an area with outstanding scenic quality. Fish Bay, St. John Baptist Bay, Nakwasina Passage, and Nakwasina Sound provide many opportunities for saltwater recreation and small boat travel. Harvest units, roads, and log transfer facilities may have an adverse affect on the scenery in these areas.

Economic and Social Quality

The lifestyles, values, and quality of life for the residents of Southeast Alaska are highly dependent on the surrounding National Forest. Our forests provide a valuable setting for recreation, hunting, fishing, and subsistence use. They also provide a setting for people seeking a remote, uncrowded living condition and for Native residents seeking to maintain customary and traditional uses. Timber harvests and road construction may have an adverse affect on the quality of life for some people.

The forests of the Northwest Baranof Project Area are a valuable economic resource for Southeast Alaska and the community of Sitka. They are valuable as a setting for commercial recreation and tourism, and spawning habitat for salmon which support a large commercial fishing industry. There is concern that widespread timber harvest and road construction would have an adverse affect on these important industries.

The forest also provides valuable timber that may be used to support a forestry and wood products industry. Since there is not currently a major wood processing industry in Sitka, many Sitka residents oppose logging in "Sitka's back yard." There is also a strong interest in establishing a small wood products industry for the Sitka area. On a larger scale, logging provides jobs for many workers in Southeast Alaska. Logs harvested in the forests around Sitka may be processed at many sites in Southeast Alaska to meet local, national, and international demand for wood products. The closure of the Sitka pulp mill has resulted in a shortage of beach logs which are used by Sitka residents for firewood. This may result in increased demand for free use or commercial timber harvest.

The amount of timber to be harvested and its value compared to logging costs is a concern. This is particularly true if small amounts of timber are to be harvested with expensive roads or yarding systems. The community of Sitka receives payments from the Forest Service in lieu of taxes for income generated from the National Forest. The primary source of these payments has been timber sales. As timber harvests decrease, the payments in lieu of taxes also decrease.

Heritage Resources

The Northwest Baranof Project Area lies largely within an area traditionally claimed by the Sitka Tlingit. Because of the importance of this area in preserving the Tlingit culture and traditional values, the Forest Service is working closely with the Sitka Tribe of Alaska to identify sites of cultural importance. Once identified, the Forest Service can protect these sites by avoiding them when planning management activities.

Historic properties are those properties included in or eligible for inclusion in the National Register of Historic Places. We almost always choose to avoid historic properties rather than mitigating adverse effects and, in response to this issue, have avoided all known cultural resource sites in the Project Area in all action alternatives.

Issue Eliminated from Detailed Study

The NEPA also requires us to "identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review." The following issue was raised during scoping, but is beyond the scope of this project.

Forest Plan Revision

It was suggested that planning for this Project cease until the Tongass Land Management Plan (TLMP) Revision is complete. Until a new Record of Decision for the TLMP is signed, the current TLMP (1979, as amended) remains in effect. We have closely adhered to current TLMP direction and Regional Best Management Practices (BMPs) in developing this Draft EIS. Comments regarding the general management direction of the Tongass National Forest, land use designations, or procedural issues are beyond the scope of this Project. These comments can be directed to the USDA Forest Service through the currently ongoing TLMP Revision Process. Write to: Tongass Land Management Planning Team, 8465 Old Dairy Road, Juneau, Alaska 99801, Attn. Steve Brink.

Permits and Licenses

To proceed with the timber harvest as addressed in this Draft EIS, we must obtain various permits from other agencies. Administrative actions on these permits would take place after the Final EIS is filed with the Environmental Protection Agency (EPA) and not sooner than 30 days following publication in the *Daily Sitka Sentinel* of notice of this decision. The agencies and their responsibilities are listed below.

U. S. Army Corps of Engineers

- Approval of discharge of dredged or fill material into waters of the United States (Section 404 of the Clean Water Act of 1977, as amended)
- Approval of construction of structures or work in navigable waters of the United States (Section 10 of the Rivers and Harbors Act of 1899).

U. S. Environmental Protection Agency

- National Pollutant Discharge Elimination Systems Review (Section 402 of the Clean Water Act)

State of Alaska, Department of Natural Resources
- Authorization for occupancy and use of tidelands and submerged lands.

State of Alaska, Department of Environmental Conservation
- Solid Waste Disposal Permit (Section 402 of Clean Water Act)
- Certificate of Reasonable Assurance (Section 401 Clean Water Act) which certifies compliance with Alaska Water Quality Standards (Section 401 Certification)

U. S. Coast Guard
- Coast Guard Bridge Permit (in accordance with the General Bridge Act of 1946) required for all structures constructed across navigable waters of the United States.

Legislation Related to This EIS

Several laws and regulations pertaining to management of federal lands were previously mentioned in this chapter. In addition to those mentioned, the following laws are relevant to the preparation of EISs for actions on federal lands. Some of these laws are specific to Alaska, while others pertain to all federal lands.

- Bald and Golden Eagle Protection Act, USC 668 (1940 as amended)
- Multiple-Use Sustained Yield Act of 1960
- Administrative Procedure Act, 1966
- National Historic Preservation Act of 1966
- Clean Air Act of 1970 (as amended)
- Marine Mammal Protection Act of 1972
- Endangered Species Act of 1973 (as amended)
- Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended)
- Cave Resource Protection Act of 1988
- Executive Order 11988 (floodplains)
- Executive Order 11990 (wetlands)

In addition, the Coastal Zone Management Act (CZMA) pertains to the preparation of the EIS. This act, passed by Congress in 1976 and amended in 1990, requires federal agencies conducting activities or undertaking development affecting the coastal zone to ensure that proposed developments are consistent with approved state coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act (AS46.40) in 1977. It contains the standards and criteria for determining the consistency of activities within the coastal zone.

The Forest Service has evaluated the alternatives to ensure that the activities and developments being proposed are consistent with approved coastal management programs to the maximum extent practicable. The results of this determination are presented in the Other Environmental Consequences section at the end of Chapter 4.

Reduction of Paperwork and the Availability of the Planning Record

An important consideration in preparation of this EIS has been reduction of paperwork as specified in 40 CFR 1500.4. In general, the objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated.

The Planning Record is available at the Forest Supervisor's Office, 204 Siginaka Way, Sitka, Alaska. The proposed alternatives were field verified and the planning record contains this site-specific detail. Other reference documents such as the Tongass Land Management Plan (TLMP, as amended 1979), the Tongass Timber Reform Act, the Resources Planning Act, and the Alaska Regional Guide EIS, are available at public libraries around the region as well as at the Supervisor's Office in Sitka.

This EIS is "tiered" to the TLMP EIS 1979, as amended. It also tiers to the Alaska Regional Guide EIS, 1983. Relevant discussions from these documents and the administrative planning record (see Literature Cited section) are incorporated by reference rather than repeated (40 CFR 1502.21).

Chapter 2
Alternatives Including the Proposed Action

Chapter 2
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Chapter 2 describes the proposed action and alternatives to the proposed action. This chapter also explains how we developed alternatives that respond to the issues described in Chapter 1, and discusses alternatives considered but eliminated from detailed study. In this chapter we discuss and compare the alternatives selected for detailed study. Also in this chapter are discussions of actions common to all alternatives, enhancement opportunities, mitigation measures, and monitoring. Finally, at the end of the chapter is the identification of the preferred alternative.

This chapter contains the key elements needed by the decision maker. It describes the alternatives and compares them based on the information and analysis in Chapters 3 and 4. These later chapters contain the detailed scientific basis for establishing a baseline and measuring the environmental consequences for each of the alternatives. For a full understanding of the alternatives and the analysis, consider the Alternative maps, and the details included in Chapters 1 through 4 of the EIS.

Ecosystem Management

On June 4, 1992, shortly after the Northwest Baranof Project was initiated, the Chief of the Forest Service announced that the Forest Service was committed to using an ecological approach in the future management of the National Forests (Robertson, 1992) known as ecosystem management. Ecosystem management is a concept of natural resource management wherein management activities are considered within the context of economic, ecological, and social interactions within a defined area or region over both the short and long term. This is a logical extension of activities that have already been taking place in land and resource management planning. The National Environmental Policy Act of 1969 (NEPA) requires agencies to "utilize a systematic, interdisciplinary process which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man's environment."

Ecosystem Management requires the skillful, integrated use of ecological knowledge at various scales to produce desired resource values, products, services, and conditions in ways that also sustain the diversity and productivity of the ecosystems being managed. Ecosystem Management is not an end in itself. It is the means to meet society's needs in ways that also restore and sustain healthy, diverse, and productive ecosystems. We do not manage ecosystems to preserve some intrinsic values or solely to imitate conditions that occurred at some time in the past. We manage them for specific purposes such as producing, restoring, or sustaining certain ecological conditions; for desired resource uses and products; for vital environmental services; and for aesthetic, cultural, or spiritual

values. These are the needs and desires of the public as communicated to us through social, economic, and political systems. The land and resource management planning process and the implementation of forest plans are where it all comes together (Robertson, June 25, 1992).

For the Northwest Baranof Project we have identified a number of specific actions that we could take to apply emerging ecosystem management techniques. We used these actions as a framework to develop the proposed action and alternatives. This framework helped us to limit the range of alternatives we developed to only those that would sustain the diversity and productivity of the ecosystems we are managing. Four of these actions are described below.

- application of appropriate silvicultural treatments
- deferred harvest for viable populations
- maintenance of beach and estuary fringe, and
- interdisciplinary analysis

Application of Appropriate Silvicultural Treatments

Within the Northwest Baranof Project Area we attempted, where possible, to design management activities which "mimic" natural disturbance patterns. We expect that the maintenance of natural disturbance patterns would likely achieve the goal of sustaining ecosystems. Silviculturists attempted to identify the natural disturbance patterns occurring on the landscape. They then designed silvicultural treatments for timber harvest which mimic those disturbance patterns, while meeting the other resource and management objectives for the Project Area.

Within the Northwest Baranof Project Area, all proposed harvest units were visited to determine existing stand health and structure. Disturbance patterns were also noted during these visits. Based on the results of these site visits and the analysis of data gathered during the visits, four categories of harvest methods were developed: clearcut with reserve trees, seed tree cut, overstory removal, and group selection. Descriptions of each harvest method follows.

Clearcut With Reserve Trees

Clearcut harvest removes all of the trees on a given area, followed by natural regeneration. Clearcutting maximizes timber production in the most economical fashion. Clearcut harvest is also recommended for management of certain insects and diseases. In addition, it is recommended for areas of high windthrow potential where significant blowdown along unit boundaries following harvest would be expected.

A clearcut with reserve trees harvest method retains snags and green replacement trees. This harvest method results in conditions similar to those found after a large, intense wind event. Clearcutting with reserve trees enables near maximum timber production with provisions made for maintaining some habitat for cavity-dependent wildlife. Two to six trees per acre are retained. Reserve trees may be uniformly scattered across the unit, clumped into small groups trees, or placed around the edges of the unit, depending on the type of yarding system used.

Figure 2-1
Old-growth Structure

Figure 2-2
20% Overstory Removal

Figure 2-3
60% Overstory Removal

Seed Tree Cut

Seed tree cuts are proposed in the Northwest Baranof Project to encourage regeneration of yellow cedar and to retain the diversity of tree species in the stand. Natural regeneration of yellow cedar following clearcutting has not been successful on the Chatham Area. Seed trees could be left in small groups or scattered uniformly across the unit. Yellow cedar of seed-bearing age and sufficient size and distribution to adequately meet the stocking requirements following harvest may be selected as seed trees. The distribution of cedar suitable for seed trees, topography, and type of yarding system will dictate the arrangement of trees to be left (6-12 trees per acre).

Overstory Removal

Overstory removal is new to Southeast Alaska and has not been done on the Chatham Area. It is proposed in the Northwest Baranof Project Area to minimize impacts to visual and soil resources, and to use previously-established understory to gain added stand structure and diversity. Overstory removal maintains a larger number of trees than the seed tree cut (20 - 60% of the existing stand). Important old-growth attributes (significant large tree component, snags, and large down woody material) can be retained. Reserve trees may be regularly spaced (as in a seed tree harvest) or grouped to meet treatment objectives. Figures 2-1 and 2-3 illustrate the structure and composition which should be left with the overstory removal harvest method.

The managed stand structure may be two or three storied, depending on the existing stand conditions and marking prescription. Many old-growth stands typically contain an overstory layer of dominant and/or codominant trees 200-250+ years old with an intermediate layer of 80-150 year old shade-tolerant species. Understory layers may contain layers of pole-size trees 40-80 years old, with layers of saplings and seedlings usually present at varying levels of stocking. Regeneration tends to be shade-tolerant species. The growth of the regeneration would be reduced in proportion to the amount of shade present. However, this growth loss can be partially offset by selecting healthy reserve trees that have potential to maintain or increase growth rates following the harvest of surrounding trees. Overstory removal allows for a range of moderate to heavy forest retention. Techniques for developing marking guidelines include using diameter limits, where all trees over or under a specified diameter are reserved, or by specifying a target basal area per acre to be retained.

Group Selection

Group selection is an uneven-aged management technique. Groups of trees ranging from 0.5 to 2 acres in size are removed across the unit. These groups create gaps in the stand canopy which facilitate natural regeneration. Systematic harvest entries, referred to as "cutting cycles," are made at regular intervals, such as every 20-30 years. Each cutting cycle will remove approximately 20% of the trees in the stand. Thus, five cutting cycles will be needed to harvest the entire original stand. Removal of the original stand would occur over approximately 80-120 years, depending on the time interval chosen (20 or 30 years). This would result in a variety of age classes and size classes present across the unit through time.

Group selection mimics wind disturbance patterns occurring across much of the Northwest Baranof Project Area. Small scale, frequent wind disturbances often result in small patches of trees being blown over, creating gaps in the stand canopy. As group selection is implemented over time, a diverse, multilayered canopy is produced. These layers are in distinct small areas as opposed to interspersed across the entire area.

Because of the large amount of shade present throughout the stand, shade-tolerant species tend to be favored during regeneration. Intermediate shade-tolerant species, such as Sitka spruce and yellow cedar, would also be expected to be present, though in lower amounts than in clearcuts or other prescriptions which open the forest floor to more sunlight. The predominant species type would depend on the size of openings created as well as the composition of the surrounding unharvested trees. Reserve trees could be retained within harvested groups to add to vertical and horizontal structure across the stand. This will better mimic the natural horizontal and vertical structure present throughout much of the landscape.

Deferred Harvest for Viable Populations

Managing wildlife habitat to maintain viable populations of all existing native and desired non-native wildlife species is a requirement of the regulations implementing the National Forest Management Act of 1976 (NFMA). It is also necessary to prevent listing of specific wildlife species as threatened or endangered under the Endangered Species Act of 1973.

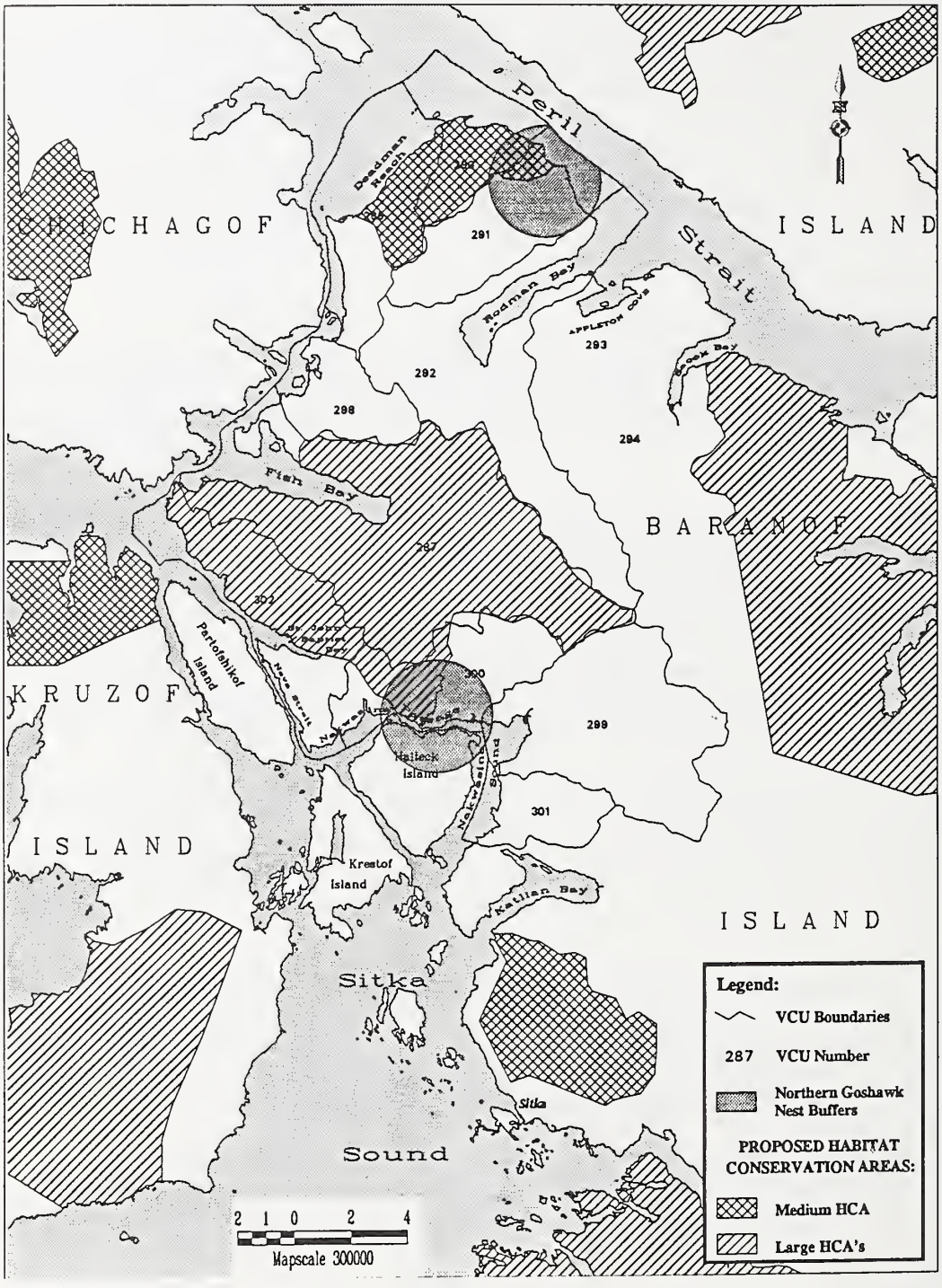
The maintenance of habitats needed for viable populations of old-growth associated wildlife species on the Tongass National Forest has received considerable attention in recent years. As a part of the ongoing process for revising the Tongass Land Management Plan, an interagency committee developed a proposed strategy for maintaining well-distributed, viable populations of wildlife associated with old-growth forests in Southeast Alaska. This strategy recommended the establishment of a network of habitat conservation areas across the Tongass National Forest as well as standards and guidelines for maintaining old-growth habitat. The committee also prepared a mapped example of how this strategy could be applied.

At approximately the same time, interagency studies were underway to gather more information about populations and habitat requirements for the Queen Charlotte goshawk. An interagency Goshawk Workshop held in Juneau on June 6-8, 1994 provided habitat management recommendations for sustaining viable goshawk populations. The recommendation was for commercial timber harvests to be deferred within a two mile radius of known goshawk nests.

Discussions of these two issues began in 1992 and continued on into 1994. Then on October 11, 1994, the Alaska Region released a draft Environmental Assessment for a proposal to adopt interim guidelines for maintaining wildlife viability. These guidelines deferred harvests of old-growth timber witihin mapped habitat conservation areas and within the two mile buffer around known goshawk nests.

As a result, we decided to adopt the proposed action as described in the draft Environmental Assessment as a framework for the alternatives developed for the Northwest Baranof Project. None of the alternatives developed for the Northwest

Figure 2-4
Proposed Habitat Conservation Areas and Goshawk Buffers



Baranof Project include timber harvests within the mapped habitat conservation areas or within the two mile buffer around known goshawk nests. Timber management activities within these areas (displayed in Figure 2-4) are deferred until after a final decision is made on these two issues.

Maintenance of Beach and Estuary Fringe

The beach and estuary fringe is one of the most productive areas of the National Forest in Southeast Alaska and includes the transition zone between the land and saltwater, with both vegetated and unvegetated conditions. Approximately 3,211 acres of beach fringe and 3,871 acres of estuary fringe occur in the Northwest Baranof Project Area. Beach fringe includes areas within 500 feet of saltwater and estuary fringe includes areas within 1,000 feet of an estuary.

These areas provide high quality habitat for wildlife, including shorebirds, waterfowl, bald eagles, and mammals. Brown bear, river otter, marten, and Sitka black-tailed deer are typical species that concentrate their activities during some or all seasons within the forests in the beach fringe. Beach fringe also provides critical habitat for the Sitka black-tailed deer during periods of deep snow accumulation.

The beach and estuary fringe is noted for its productive stands of old-growth forest. In fact, much of the logging that occurred historically in the Northwest Baranof Project Area occurred in the beach and estuary fringe. This was due to abundant timber resources within the fringe and limited ability to access interior areas. Tide flats in the beach and estuary fringe have grasses, sedges, and other vegetation which are used as forage by a variety of wildlife. The beach and estuary fringe is also valuable for its scenery and as a setting for most of the recreation that occurs within the Project Area. There is also a high concentration of historical and cultural resources located within this fringe.

All of these values could be affected by additional logging activities within the beach fringe. It was for that reason that we decided early in the planning process that these areas would not be proposed for timber harvest as a part of the Northwest Baranof Project. We recognized that there would be some impact to the beach fringe from LTFs, logging camps, and transportation facilities as a result of any proposed activities. We determined that the impacts from these facilities would be limited both in scale and duration, and were an acceptable impact from upland timber management activities. It is important to recognize that although the beach and estuary fringe has not been proposed for timber harvest during the Northwest Baranof Project, this does not remove these areas from consideration for future timber management activities. In fact, there are many opportunities for small-scale silvicultural treatments within the beach fringe that would result in the output of wood products.

Interdisciplinary Analysis

Both NEPA and ecosystem management involve a systematic, interdisciplinary process. We use an integration of ecological knowledge including physical, biological, and social sciences to produce desired resource values, products, services, and conditions. At the same time, we must sustain the diversity and productivity of the ecosystems we manage.

The ID Team for the Northwest Baranof Project worked together during field reconnaissance, resource inventories, identification of the proposed action, and development of alternatives. In particular, the ID Team process was employed to review

proposed timber harvest units and roads. Each potential unit and road was discussed and potential resource concerns were identified. As a result of this process, we eliminated many environmentally sensitive areas from further consideration for timber harvest before we developed alternatives.

Alternative Development

In this Draft EIS, five alternatives explore ways to satisfy public concerns and resolve the issues discussed in Chapter 1. These include a no-action alternative and four action alternatives. Each of the action alternatives represented in this EIS responds differently to the issues discussed in Chapter 1. The action alternatives were developed as site-specific proposals, the environmental consequence of which could be clearly displayed. Collectively the alternatives were developed to explore ways to satisfy public concerns and resolve issues, while responding to the purpose and need for the project. From this range of alternatives, the Forest Supervisor has a basis for making an informed decision.

In developing the harvest units and road systems for this Project, we followed direction, standards, and guidelines contained in the current TLMP, Alaska Regional Guide, and applicable Forest Service manuals and handbooks. The first step in formulating alternatives was the development of a logging plan that identified timber harvest units and the associated road systems, that could be assigned to any of the alternatives. This unit and road "pool" was carefully examined in the field and reviewed by the ID Team before it was finalized. Next we determined various options to resolve the issues and identified various approaches or "themes" that could serve to guide the alternatives. After further review, we finalized the alternative themes, assigned specific units and roads to each alternative, and insured that each alternative considered in detail is consistent with the current TLMP. Finally we have identified mitigation measures, enhancement projects, and the monitoring requirements which are listed in Appendix A.

The ID Team looked at the proposed harvest units from two levels: the landscape level, which considers effects of management practices over large areas (such as VCUs, watersheds, or viewsheds); and the stand level, which deals with individual harvest units. At the landscape level, we maintain large tracts of undisturbed old growth by concentrating timber harvest in certain areas, minimizing the edge effect by designing larger harvest units, and using fringe and stream buffers for corridors between old-growth blocks.

At the stand level, we reduced harsh edges by unit placement and feathering edges of cutting units, and provide for stand diversity by leaving snags in harvest units (where safety regulations allow) or retaining small patches of uncut timber in harvest units (where feasible and practical). We considered all of these concepts during the selection and design of individual harvest units and roads, and the assignment of these to specific alternatives.

Alternatives Eliminated from Detailed Study

Three alternatives were considered during the early stages of the alternative development process that were subsequently eliminated from detailed study. These alternatives are described below:

Road to Rodman Bay -The original proposed action for the Northwest Baranof Project included construction of approximately 80 miles of road, which would have been interconnected between Nakwasina Passage and Rodman Bay. In addition to providing transportation for timber, the road would have provided portions of a road system extending from Sitka to Rodman Bay. In Sitka's October 1993 election, Sitka voters opposed further consideration by the City of a road to Rodman Bay by 2-1. Forest Service consideration of this interconnected route was subsequently dropped. In addition, no harvest is planned in the Fish Bay drainage in any alternative considered in detail, further precluding consideration of an interconnected road system.

Harvest in Fish Bay and along Deadman Reach - As discussed earlier in this chapter, the Alaska Region has released a draft Environmental Assessment that proposed interim guidelines for maintaining viable wildlife populations. One component of this proposal was to establish a network of habitat conservation areas across the Tongass. Two of the mapped areas lie within the Northwest Baranof Project Area (see Figure 2-4). As a result, we have decided to defer consideration of timber harvest in the Fish Bay drainage and along Deadman Reach until a final decision is made on this issue. Therefore, no alternative was considered in detail that included harvest in these two areas.

VCUs 310, 312, and 313 - These VCUs at the south end of the Project Area (nearest to Sitka) were dropped from consideration after initial field reviews found little timber suitable for harvest at this time.

Proposed Action

Early in the planning process for the Northwest Baranof Project, we developed a proposed action. The proposed action was the initial proposal for timber harvest activities in the Northwest Baranof Project Area. It served as a starting point for public scoping, for development of alternatives, and for environmental analysis.

We displayed the proposed action in our scoping documents and at our scoping meetings. It provided the public and other agencies with a clear picture of what we proposed within the Northwest Baranof Project Area and allowed them to focus their comments on specific areas within the Project Area, on specific aspects of the proposal, and on specific issues of concern.

The proposed action also served as a starting point for alternative development. It was the first alternative developed (Alternative 1). It has been altered somewhat during the planning process as we acquired additional information about the Project Area. It also changed as a result of other factors such as the termination of the APC contract and proposed requirements for maintaining viable populations of wildlife species.

The proposed action currently includes the harvest of approximately 35 mmbf of sawlog timber from an estimated 1,725 acres. Approximately 12 miles of existing road would be reconstructed; 18 miles of new road and 10 miles of temporary road would be constructed to facilitate timber removal. Six log transfer facilities (LTFs) would be constructed or reconstructed to implement the proposed action. In this proposal, we expect ground-based logging camps will be used at previous sites in Rodman Bay and St. John Baptist Bay, and new camp sites at Noxon Creek and in Schulze Cove. Sitka and the existing logging camp at False Island may also be used in addition to floating logging camps at some locations. See Alternative 1 for a complete description of the proposed action.

Alternatives Considered in Detail

We considered five alternatives (four action alternatives and a no-action proposal) in detail. Each alternative was developed to respond differently to the issues, and to provide a range of choices for the Forest Supervisor and the public. We have included maps (distributed with this Draft EIS) which illustrate the proposed roads and harvest units for each of the five alternatives.

For each action alternative, there is a discussion of the theme or intent of the alternative. Following the description of the alternatives, there is a discussion of post-harvest silvicultural treatments, enhancement opportunities, and mitigation measures. Table 2-1 summarizes the volume and acres of timber harvest and logging method, and roads proposed for development and use.

Alternative 1 (The Proposed Action)

This alternative represents the "proposed action" as presented during public scoping and described earlier in this Chapter. It has been modified since public scoping to reflect harvest units dropped from further consideration because of resource concerns. This alternative distributes timber harvest throughout the Northwest Baranof Project Area. It proposes timber sales in seven individual geographic areas within the Project Area. Alternative 1 proposes timber harvest on 1,725 acres with an output of approximately 35.5 mmbf of sawlog volume.

Wildlife habitat and subsistence resources are maintained along the north shores of Nakwasina Passage and St. John Baptist Bay, and throughout the Fish Bay drainage. The current visual quality on Baranof Island along the Alaska Marine Highway route would be maintained from Fish Bay to Sitka. Opportunity for increased motorized vehicle, bicycle, and foot access would be provided on the road system south of St. John Baptist Bay.

Alternative 2

This alternative concentrates timber harvest in three areas that have had previous logging activity: Rodman Bay, St. John Baptist Bay, and Lisa Creek. It also minimizes further fragmentation of old growth as a result of additional timber harvest, especially in and adjacent to the Fish Bay and Nakwasina River watersheds. This alternative maintains the existing conditions in much of the Northwest Baranof Project Area by deferring timber harvest in many of the areas which have seen only limited harvest in the past. Alternative

2 proposes timber harvest on 2,505 acres with an output of approximately 51.9 mmbf of sawlog volume.

Wildlife habitat and traditional subsistence use areas are maintained at the head of Nakwasina Sound, along the north shores of Nakwasina Passage and St. John Baptist Bay and throughout the Fish Bay drainage. The current visual quality on Baranof Island along the Alaska Marine Highway route would be maintained from Deadman Reach to St. John Baptist Bay. Logging economics would be boosted by using reconstructed roads in this alternative.

Alternative 3

This alternative concentrates timber harvest in the north end of the Northwest Baranof Project Area with logging at Schulze Cove and Rodman Bay. It also defers timber harvest in those portions of the Project Area closest to Sitka. This alternative emphasizes the maintenance of existing conditions south of Fish Bay and minimizes further fragmentation of old growth in that area. Alternative 3 proposes timber harvest on 1,889 acres with an output of approximately 38.8 mmbf of sawlog volume.

Wildlife habitat and traditional subsistence use areas south of Fish Bay are not affected by this alternative. The current visual quality on Baranof Island along the Alaska Marine Highway route would be maintained from Fish Bay to Sitka.

Alternative 4

This alternative distributes timber harvest throughout the Project Area. It proposes the highest level of timber harvest of all the alternatives while meeting standards and guidelines for other resources, and current environmental, political, and social constraints. It proposes timber sales in seven individual geographic areas within the Project Area and creates a mosaic of diverse forest age structures. Alternative 4 proposes timber harvest on 3,263 acres with an output of approximately 66.9 mmbf of sawlog volume.

ORV use near Sitka would be enhanced due to road construction and maintenance. This alternative provides the opportunity for better sale scheduling and economic return both locally and nationally. Alternative 4 most nearly meets the direction of the current Tongass Land Management Plan for resource production in the Project Area.

Alternative 5 - No Action

This alternative provides the baseline for measuring effects of all action alternatives. It is required by the NEPA, and may be selected by the Forest Supervisor. No road construction or logging would occur under this alternative.

Table 2-1
Alternative Summary

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Sawlog Volume (mmbf)	35.5	51.9	38.8	66.9
Proposed Harvest Acres	1,725	2,505	1,889	3,263
Number of Units	96	107	71	153
Proposed Harvest by Harvest System				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Skyline Acres	885 51%	862 34%	590 31%	1,196 37%
Helicopter Acres	840 49%	1,643 66%	1299 69%	2,067 63%
Helicopter Volume (mmbf)	15.1	32.2	24.8	39.5
Proposed Harvest Acres by Silvicultural Prescription				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Clearcut w/Reserves	810 47%	1,002 40%	775 41%	1,338 41%
Seed Tree Cut	347 20%	626 25%	604 32%	816 25%
Overstory Removal	325 19%	576 23%	208 11%	652 20%
Group Selection	243 14%	301 12%	302 16%	457 14%
Proposed Harvest Volume (Sawlog) by Silvicultural Prescription (in mmbf)				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Clearcut w/Reserves	19.7	23.6	18.6	32.5
Seed Tree Cut	7.9	15.2	14.0	18.9
Overstory Removal	6.6	11.4	4.4	12.8
Group Selection	1.3	1.7	1.8	2.6
Proposed Roads and Log Transfer Facilities (LTFs), and Helicopter Insertion Log Transfer Sites (HILTS)				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4
New Road Miles	18.5	18.5	8.9	30.4
Reconstruction Miles	11.9	13.1	9.0	16.5
Temporary Road Miles	12.2	8.2	6.5	14.4
No. of LTFs	6	4	3	7
No. of HILTS	1	1	1	2

Comparison of Alternatives by Issue

Fish Habitat

Our evaluation in Chapter 4 shows that the potential effects on fish habitat and related water quality are minimal for all alternatives. All alternatives meet the requirements of the Clean Water Act. We will continue to adhere to the TTRA's requirement to provide a minimum 100-foot buffer on Class I streams and Class II streams flowing directly into Class I streams, which will minimize direct stream channel impacts from proposed timber harvest and road construction.

Streams encountered during road construction are crossed by culverts or bridges. We use bridges where large volumes of water are anticipated. Bridges would be left in place in alternatives that include road maintenance after harvest (see Appendix D). Culverts are used to cross small drainages and to provide relief drainage under the road as necessary. Culverts placed in Class I or II streams are designed and installed to allow fish passage.

Both the Tongass Timber Reform Act and the Tongass Land Management Plan require that we use Best Management Practices (BMPs) to prevent degradation of streams during road construction. The BMPs prescribe numerous timing and construction constraints for instream road construction work and we make BMPs a part of all stream course protection plans for Class I and II streams. Fish passage requirements for Class I and II stream crossings are also specified.

Although culverts and bridges will be installed using BMPs, each bridge or culvert constitutes a potential risk to fish habitat should the structure fail due to unforseen natural occurrences. Although such risks are minimal, a comparison of the numbers of Class I and Class II stream crossings helps the decision maker assess the relative risks of each alternative. Table 2-2 lists the number of Class I and II stream crossings within each alternative.

Table 2-2
Proposed Construction of Roads Across Class I and II Streams by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Class I Stream Crossings	29	27	17	36	0
Class II Stream Crossings	7	7	4	10	0

Source: Lorenz 1995.

Wildlife Habitat and Populations

Table 2-3 displays potential reduction in wildlife habitat capabilities for deer, bear, marten, and mountain goat in the Northwest Baranof Project Area. This table displays the estimated habitat capability in 1995, and the estimated reduction in this capability if the actions proposed are implemented. Habitat capability does not indicate current or future populations, but is a relative means to estimate and compare effects.

All action alternatives would decrease habitat capabilities by 2 percent or less for deer, 1 percent or less for brown bear, 4 percent or less for marten, and 2 percent or less for mountain goat. Alternative 5 would maintain the current capabilities for wildlife.

Table 2-3
Potential Reduction in Wildlife Habitat Capability (in Percent) in the Project Area by Alternative

Species	1995 Habitat Capability	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Sitka Black-tailed Deer	4,220	-1	-<2	-1	-2	0
Brown Bear	183	-<1	-1	-<1	-<2	0
Marten	256	-2	-3	-2	-4	0
Mountain Goat	65	-2	-3	-<1	-3	0

Source: Hartmann 1995.

Old Growth

Old-growth forests are ecosystems distinguished by the presence of large trees, accumulations of large dead woody material and a variety of canopy layers. For inventory purposes we define old-growth forest in the Geographic Information System (GIS) data base as, "forest habitat over 150 years old with an average diameter at breast height greater than nine inches, and with timber volumes greater than 8,000 board feet per acre." Based on this definition, a total of 51,651 acres of old-growth forest occur in the Northwest Baranof Project Area at this time.

Table 2-4
Acres of Old Growth

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Acres Remaining	49,979	46,309	49,892	48,573	51,651
Percent of Current	97%	95%	96%	94%	100%

Source: Hartmann 1995.

Marine Environment

The effects of timber harvest and road construction on shellfish populations would be minimal for all the alternatives. Application of the siting guidelines developed by the Alaska Timber Task Force will minimize the potential effects of LTFs on shellfish populations. The short period of use and relatively small volume of timber that will go through the LTFs will also minimize bark accumulation. Construction of the proposed LTFs will affect little of the available marine habitat. Short and long term effects on the marine ecosystem will be minimal as a result of LTF use.

Physical access to subsistence fish and shellfish areas will not be significantly changed by any of the action alternatives, however logging camp and LTF traffic may conflict with subsistence users. In addition, the presence of logging camp residents may discourage other users because of crowding. Competition for fish and shellfish is likely to be increased by residents of the logging camps during timber harvest activities (three to five years). Competition would be most noticeable for limited resources like king crab, and least noticeable for more abundant resources like pink salmon.

If an action alternative requires an LTF in St. John Baptist Bay, a barge LTF facility will be used. This will minimize impacts to the bay's sable fishery. Table 2-5 indicates the locations of LTFs for each alternative and the estimated volume of timber each LTF would process for each alternative. Locations of proposed LTFs and HILTS are displayed on the Alternative maps.

Table 2-5
Volume of Timber to be Processed (mmbf) at Each Log Transfer Facility (LTF) or Helicopter Insertion Log Transfer Site (HILTS) by Alternative

	Estimated Sawlog Volume (mmbf) to be Processed			
LTF/HILTS	**Alt. 1**	**Alt. 2**	**Alt. 3**	**Alt. 4**
Appleton Cove		5.7		
NE Rodman	4.3		5.6	7.3
Rodman	7.1	24.8	21.9	24.8
Goose Cove (HILTS)		2.9	2.9	2.9
Schulze Cove	8.2		8.4	8.4
St. John Baptist	7.6	13.1		
St. John Baptist S.				4.4
Nakwasina Passage				8.7
Noxon	2.9			2.9
Nakawsina (HILTS)	2.1			2.1
Lisa Creek		5.4		
Lisa Creek NW	3.3			5.4
Total	35.5	51.9	38.8	66.9

Source: Allio 1995

Subsistence

Our evaluation of subsistence use of deer indicates that there is a significant possibility of a significant restriction of subsistence use of deer in the Project Area for Sitka residents regardless of which alternative is selected. The potential foreseeable effect from the action alternatives do not present a significant possibility of a significant restriction of subsistence uses of brown bear, fur bearers, shellfish, and other foods.

Recreation

Under all alternatives, the Northwest Baranof Project Area has potential to provide a wide range of recreation opportunities, activities, settings, and experiences. The change in recreation setting because of timber harvest and/or road construction activities may affect the recreational experience and, therefore, overall satisfaction of the forest visitor. Visitors seeking a primitive recreational experience may not be satisfied in an area with active timber management activities. On the other hand, visitors who do not require a natural setting for their recreation activities may appreciate the opportunity to use a road for access to the interior of the Project Area. However, road access will be limited because the area will not be connected to a public road system or the Marine Highway.

Active timber planning and harvest operations may displace recreationists and outfitter/guides from areas of traditional use. Activities which have a low tolerance for the presence of other humans (i.e., bear hunting) will be particularly impacted. These effects are expected to decrease significantly after harvest activities cease and logging camps are closed.

Table 2-6
Net Change From Natural to Modified Recreation Setting (in percent of total Project Area)

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
% Change	6%	5%	4%	8%	0%

Source: Flynn 1995

Scenic Quality

Alternatives 1 through 4 would result in additional visual impacts of varying degrees in the Northwest Baranof Project Area. These impacts would come primarily from timber harvest, road construction, and the construction of LTFs. These activities create unnatural lines and textures in the landscape which contrast with the rough, even-texture characteristic of Southeast Alaska old-growth rainforest. These visual impacts, in many cases, will be evident to the average forest visitor. We can measure visual impacts by the resulting acres within each Visual Quality Objective, which would occur for each alternative. Visual Quality Objectives are defined in the Glossary.

Table 2-7
Visual Quality Objectives (in acres)

Visual Quality Objectives	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Retention	3,216	3,208	3,208	3,216	3,216
Partial Retention	47,070	49,258	46,884	40,510	61,046
Modification	75,774	75,441	75,968	81,950	64,030
Maximum Modification	29,670	27,853	29,670	30,084	27,468

Source: Ouderkirk 1995

Economic and Social Quality

Table 2-8 displays the annual employment (number of jobs) and income (wages) associated with each alternative. The jobs and wages listed include those both directly and indirectly dependent on the timber industry. The volume of timber harvested for each alternative results in a level of jobs and wages associated with that volume. Jobs and wages are based on the Forest Service economic model, IMPLAN.

Table 2-8
Projected Annual Timber-Related Employment and Income

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Number of Jobs	88	129	96	166	0
Wages (in millions)	$3.7	$5.5	$4.1	$7.1	0

Source: Morse 1995.

Table 2-9
Comparison of Environmental Consequences

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Old Growth	78	77	78	76	81
% Remaining					
Wetlands					
% of Wetland Acreage Affected	1.5	0.9	0.7	1.3	0
Wildlife Habitats					
% of Habitat Affected					
Beach Fringe	0.2	0.2	0.1	0.3	0
Estuary Fringe	0.8	0.5	0.2	0.6	0
Riparian	0.8	1.0	0.8	1.2	0
Old Growth	3.3	4.6	3.4	6.1	0
Second Growth	0.5	0.9	0.7	1.1	0
Alpine/Subalpine	0	0	0	0	0
Wildlife Habitat Capability					
% Reduction of Habitat Capability					
Sitka Black-tailed Deer	-1	-2	-1	-2	0
Brown Bear	-1	-1	-1	-1	0
Marten	-2	-3	-2	-4	0
Mountain Goat	-2	-3	-<1	-3	0
Bald Eagle	0	0	0	0	0
Recreation					
% Change in Setting					
Natural	-5.8	-5.8	-4.0	-9.3	0
Modified	+2.9	+2.9	+2.0	+4.7	0
Visual Quality					
% Change in Acres					
Retention	0	-0.2	-0.2	0	0
Partial Retention	-22.9	-19.3	-23.2	-33.6	0
Modification	+18.3	+17.8	+18.6	+28.0	0
Maximum Modification	+8.0	+1.4	+8.0	+9.5	0
Economics					
Number of Jobs	88	129	96	166	0
Wages ($millions)	$3.7	$5.5	$4.1	$7.1	0

Actions Common to All Alternatives

All action alternatives would include building roads and LTFs, harvesting timber, and providing camp facilities for workers. For each of these activities, a range of options and methods is available. The various options and methods available for the action alternatives are described below. With these defined, the consequences of these actions on the various natural resources can be evaluated.

Roads

Timber harvest in Southeast Alaska typically requires a road network to transport logs from harvest units to a LTF. This network is made up of specified arterial, collector, and local roads. All roads are built to appropriate standards to handle planned traffic and to minimize impacts to the environment. They are normally intended to provide long-term access for recurrent resource management activities. Arterial and collector roads are the backbone of the transportation system, accessing large land areas. Local roads are generally dead-end roads branching off of arterials or collectors to service small groups of units or a single unit. In addition to these, temporary roads are constructed when needed for one-time, short-term harvest access. After log haul is completed, temporary roads are effectively taken out of service by waterbarring the roadbed and removing drainage structures. The miles of road construction planned by alternative is displayed in Table 2-1.

After construction the road system is managed to provide necessary access for accomplishing land use objectives and activities. Environmental protection, user safety, recreation, and maintenance of improvements for future use are all taken into consideration when formulating a road management plan. Roads may be physically or administratively closed, obliterated, or maintained open. Commonly used methods of road closure include bridge removal, signing, barricading and gating. Roads that are permanently closed have all drainage structures removed to provide free passage of storm runoff. Rock can be removed from temporary roads and stock-piled for use in future road construction. Tables in Appendix D indicate, by alternative, how the roads will be managed following timber harvest.

Log Transfer Facilities

Two commonly used types of LTFs are the low-angle slide and the low-angle ramp. Barge facilities and Helicopter Insertion Log Transfer Sites (HILTS) are also proposed in this Project.

Low-Angle Slide

A low-angle slide consists of a ramp constructed of metal rails at a slope of 10 to 15 percent. Logs slide along the rails by gravity or they may be pushed by a loader. Low angle slides are relatively inexpensive to re-activate once abandoned.

Low-Angle Ramp LTF

A low angle ramp is constructed from quarry rock, creating a ramp 30 feet wide and 200 feet long. A loader is used to place logs directly in the water. Low-angle ramps are proposed for sites where the shore gradient is close to 15 percent. The ramp is

inexpensive to construct, requires very little maintenance, and is inexpensive to re-activate once abandoned.

Barge LTF

A barge facility uses a loader or stacker to place logs directly onto a barge. An upland storage yard would be needed nearby. Barge LTFs are expensive to construct and operate. An existing LTF at Appleton Cove and a planned LTF at St. John Baptist Bay are proposed barging facilities.

Helicopter Insertion Log Transfer Site (HILTS)

At a HILT site, logs are lowered into the water by helicopter. The HILTS would be enclosed by a log boom tied to shore. Logs can be loaded directly from the log boom to a barge, or towed to an LTF where they can be removed, bundled, and returned to the water for rafting. We propose HILTS in the Northwest Baranof Project Area in Nakwasina Sound and Goose Cove.

Table 2-5 indicates the locations of LTFs and the estimated volume of timber each LTF and HILTS would process for each alternative. LTF and HILTS locations are displayed on the Alternative maps.

Timber Harvest Systems

The logger may use ground-based equipment, cable logging systems, or helicopters to move logs. The method used depends upon many factors, including access, topography, slope, and resource protection concerns. We are proposing both cable and helicopter timber harvest methods in all action alternatives.

High lead yarding is commonly used in Southeast Alaska. It is a cable yarding system using a tower (typically 90 feet) with $1^{1}/_{2}$ or $1^{3}/_{8}$ inch mainline cable. It is best used over relatively short yarding distances (600 feet) and reasonably stable soil conditions. Logs are dragged along the ground to the landing.

Several cable systems in use in Alaska and the Pacific Northwest are collectively called skyline systems. These systems generally allow for longer yarding distances (1,000+ feet) and keep one end or all of the log suspended above the ground for most, if not all, of the yarding distance.

Helicopter logging is done by slinging logs underneath large helicopters and flying them (normally downhill) to the landing. Helicopters are typically used for situations where road access is precluded, or other yarding methods would cause unacceptable soil displacement or damage to surrounding vegetation. Yarding distances can be a mile or more, but the high cost of operations usually restrict their use to distances of 3,000 to 4,000 feet. Logs are landed either directly into the water, onto large landings for eventual truck haul to the LTF, or onto a barge for transport to a mill.

Each logging system has advantages, disadvantages, and constraints which limit its applicability. We selected logging systems for harvest units in the Northwest Baranof Project to capture the advantages of each system within the applicable constraints.

Camp Facilities

We are proposing ground-based logging camps at previously used sites in Rodman Bay, St. John Baptist Bay, and new sites at Noxon Creek and Schulze Cove. Harvest in the Project Area will be served out of these camps, floating camps, or existing logging camps in nearby areas. If a ground-based or floating camp is not located near an LTF, a watchman trailer and maintenance shop would be installed. We complete plans for logging camps with the timber purchaser after the timber sale is sold.

A logging camp for timber sale operations of the size and duration of the Northwest Baranof Project would be expected to house 50 to 100 people. This would include both individual workers and families. It would be constructed during the first year of operation while the roads are being built. The camp would be in operation for three to five years, depending upon the volume of timber to be logged and number of workers employed. A typical logging camp provides living and office space within temporary modular structures and mobile homes, one or more rough-lumber equipment storage and maintenance shops, and electricity provided by a diesel-powered generator. Camps are connected to the timber harvest road system.

Proposed Harvest Units or Combinations of Harvest Units Over 100 Acres

Regulations implementing the National Forest Management Act (NFMA) provide that 100 acres is the maximum size of created openings to be allowed for the hemlock-Sitka spruce forest type of coastal Alaska, unless excepted under factors defined in the Alaska Regional Guide (USDA Forest Service 1983). These factors include:

- Natural and biological hazards to the survival of residual trees and surrounding stands
- Topography
- Relationship of units to other natural or artificial openings and proximity of units
- Coordination and consistency with adjacent land use designations
- Effect on water quality and quantity
- Effect on wildlife and fish habitat
- Regeneration requirements for desirable tree species
- Transportation and harvest system requirements
- Relative total costs of preparation, logging, and administration of harvest

Where it is determined by an interdisciplinary analysis that exceptions to the size limit are warranted, the actual size limitation of openings may be up to 100 percent greater (200 acres total) if required due to natural biological hazards to the survival of residual trees and surrounding stands, and 50 percent greater (150 acres total) for the remaining factors. The Forest Supervisor will identify the conditions under which the larger size is warranted.

Table 2-10
Proposed Harvest Units or Combinations of Units Over 100 Acres

Unit Numbers	Total Acres	Alternatives	Factors Warranting a Larger Size
3301, 3302, 3303, 3304	121	4	Transportation and harvest system requirements; relative total costs of preparation, logging, and administration of harvest
3311, 3312, 3313, 3314	123	3, 4	Transportation and harvest system requirements; relative total costs of preparation, logging, and administration of harvest
3012	138	2, 3, 4	Natural and biological hazards to the survival of residual trees and surrounding stands (entire stand is infested with mistletoe)
3304, 3313, 3315	101	1	Transportation and harvest system requirements; relative total costs of preparation, logging, and administration of harvest

Source: Mork 1995

Post-harvest Silvicultural Treatments

The post-harvest silvicultural treatments we expect to use include precommercial thinning and hand planting of harvested units. In addition, we will survey previously harvested areas and recommend precommercial thinning when appropriate. Proposed hand planting and precommercial thinning of harvest units is displayed for each alternative. For more detailed information on precommercial thinning and hand planting proposed, see Appendix A.

Reforestation is the process of establishing a new forest on harvested areas. The Forest Service is required by law (NFMA), regulations, and policies to plan timber harvests only on lands where there is assurance that such lands can be regenerated within five years after the harvests are completed. Reforestation can be accomplished by natural seeding from surrounding timber stands or by planting. Natural regeneration is the method of choice in Southeast Alaska and usually produces satisfactory results.

Hand planting may be necessary or desirable when a natural source of seed for a desired species is inadequate to maintain a timber stand's current species composition, or when it is desirable to reduce the time needed for natural regeneration. Table 2-11 presents by alternative the potential number of acres identified for hand planting. The number of acres to be hand planted to maintain species composition can be reasonably estimated before harvest. We will not know the specific location and acreage where planting will be necessary to supplement natural regeneration until post-harvest restocking surveys assess the adequacy of natural regeneration.

Natural regeneration often results in dense stands of trees. We use precommercial thinning to regulate the growth of these young trees. By thinning tree stands, we can control species composition, improve genetic composition, enhance wildlife habitat, and increase windfirmness. Precommercial thinning creates more space for the remaining trees to grow, and may increase financial return (Ruth and Harris 1979). The number of acres identified for precommercial thinning by alternative are displayed in Table 2-11. Actual acres thinned may vary from those predicted as a result of site-specific examinations.

Table 2-11
Acres Proposed for Hand Planting and Precommercial Thinning by Alternative

Alternatives	1	2	3	4
Hand Planting	344	412	277	573
Precommercial Thinning	932	1,538	1,061	1,844

Source: Dougan 1995

Enhancement Opportunities

The Knutson-Vandenberg Act (1930), as amended by the National Forest Management Act (NFMA) of 1976, allows the Forest Service to collect receipts from timber sales for Sale Area Improvement (SAI) projects. Top priority for these funds is to ensure stand regeneration. The Sitka District Ranger will prioritize subsequent projects, such as precommercial thinning, fisheries enhancement, and soil stabilization and list them on the SAI plan. If funding for resource enhancement projects is not available from K-V receipts, these projects could be added to the regular program budget. The Sitka Ranger District will develop the SAI plan after the ROD is signed. We identify specific projects in Appendix A.

Mitigation Measures

We began applying mitigation measures during the planning phases of this project. We have applied standards, guidelines, and direction contained in the current TLMP, the Alaska Regional Guide, and applicable Forest Service manuals and handbooks in the development of alternatives and the design of harvest units and roads.

We will identify specific mitigation measures to reduce or eliminate adverse effects in the Northwest Baranof Project Area at the time the Record of Decision (ROD) is signed. We used issues identified during scoping to define the resource areas where mitigation is needed. A brief summary of mitigation measures common to all alternatives is included in Appendix A. Specific mitigation measures as applied to each harvest unit and road are identified on the respective unit and road cards. These cards are an important tool for implementing the project as they list design considerations and provide a mechanism for tracking project implementation. Unit Cards are included in Appendix G. Road Cards are in Appendix H.

Monitoring

Monitoring is designed to determine if the resource management objectives of the Northwest Baranof Project have been met. The results will be used to verify implementation and effectiveness of selected mitigation and protection measures in a timely manner. Three types of monitoring (described below) were recognized in the development of the monitoring plan. The monitoring plan is fully described in Appendix A. Regardless of which alternative is selected, we will conduct monitoring activities over the course of the Project to determine if standards and guidelines for the Project Area have been met.

Implementation monitoring assesses whether the Project was implemented as designed and whether or not it complies with the TLMP. Effectiveness monitoring examines the effectiveness of the Project's design, including unit layouts, road location, and mitigation measures that preserve natural resources and their beneficial uses. Each activity is monitored separately, and the resulting data is analyzed and reported by the Forest Service staff responsible for the activity. The Forest Service conducts validation monitoring to determine if the assumptions or models used in

planning are correct. Monitoring is usually carried out at the Regional level in conjunction with research and is identified in the Forest or Regional planning process. As such, no validation monitoring is identified in this Draft EIS.

Identification of the Forest Service Preferred Alternative

The Forest Service preferred alternative is Alternative 2. All alternatives will be examined carefully before preparation of a Final EIS and Record of Decision (ROD), taking into consideration public comments on this Draft EIS, and any additional information or analysis.

In the ROD, the Forest Supervisor, who is the deciding officer, may decide to:

- select one of the alternatives analyzed within the Final EIS,
- modify one alternative or mix components from two or more alternatives, as long as the environmental consequences of the action have been fully analyzed within the Final EIS, or
- reject all alternatives and request further analysis.

Chapter 3
Affected Environment

Chapter 3
Affected Environment

In this chapter we document the existing condition of resources within the Northwest Baranof Project Area. We have included discussions of all resources that may be affected by the proposed actions. We will use this information as the baseline for measuring the effects of the alternatives we discuss in Chapter 4.

Value Comparison Units (VCUs)

Value Comparison Units (VCUs) are distinct geographic areas defined by the TLMP, each encompassing a drainage basin containing one or more large stream systems. The boundaries usually follow watershed divides. The Tongass National Forest contains 867 VCUs. We use VCUs to describe the locations of specific resources in the Project Area. Table 3-1 provides a summary of information about Project Area VCUs.

Table 3-1
Summary of Northwest Baranof VCUs

VCU	Local Name	Acres	Previous Harvest (Acres)	Shoreline (miles)	Existing Specified Road (miles)	LUD
287	Fish Bay	42,392	1,669	23.90	9.6	III
288	Range Creek	7,126	0	10.70	0.0	III
289	Nixon Shoal	8,560	279	12.20	0.0	III
290	Cozian Reef	5,262	149	5.00	0.0	III
291	Peschani Point	12,010	1,935	4.40	6.6	IV
292	Rodman Bay	24,307	3,885	14.90	14.4	IV
299	Annahootz Mountain	23,669	1,712	6.70	0.4	IV
300	Nakwasina Passage	12,757	1,091	9.60	8.4	III
301	Nakwasina Sound	5,703	787	4.20	3.9	III
302	Neva Strait	14,217	689	22.40	8.0	III
Total		156,003	12,196	114.00	51.3	

3 Affected Environment

Ecological Patterns and Processes

Ecosystem management involves a shift in focus from sustaining production of goods and services to sustaining the viability of ecological, social, and economic systems now and into the future. Ecosystems function sustainably when they remain within the normal bounds of their natural and biological environment. Across large areas, ecosystem processes such as disturbance, succession, evolution, natural extinction, recolonization, and fluxes of materials that characterize the variability found in natural ecosystems should be present and functioning. Management activities should maintain resilient ecosystems capable of returning to the natural range of variability if left alone; natural disturbance patterns should be conserved or restored.

Southeast Alaska is a unique ecosystem consisting primarily of hundreds of islands separated by narrow waterways. These islands range in size from less than one acre to over one million acres. Forests of this region have developed under relatively short, cool, and extremely wet growing seasons, with cloud cover more common than clear days. Rainfall and temperature patterns are highly variable. Soil moisture is excessive, rather than limiting, and fire is essentially absent. Consequently, most of these forests are old growth.

Ecological Provinces

Ecological provinces are large land areas that are distinguished by differences in ecological processes, and by similarities in climate and geography (TLMP Revision SDEIS, Chapter 3, Biodiversity). The Tongass National Forest has 21 ecological provinces.

The majority of the Northwest Baranof Project Area lies within the West Baranof Island Ecological Province. This Province includes Kruzof Island, western Baranof Island from Fish Bay south along the divide to Patterson Bay on the east side of Baranof, and around the southern tip of Baranof back to Fish Bay. A small portion of the Project Area lies within the East Baranof Ecological Province. This Province includes Catherine Island and all lands on Baranof Island east of a line from Fish Bay (in VCU 287) along the divide to Patterson Bay (in VCU 283). The East and West Baranof Island Ecological Provinces include 1,164,603 acres.

Ecological Processes

Ecological processes create the environmental conditions which shape plant and animal communities present in a National Forest. Significant ecological processes in the Northwest Baranof Project Area include:

Topography and Geology - Physical characteristics of the Northwest Baranof Project Area include steepness of slopes, soil origin, and elevations. In addition, the distribution and age of the natural vegetational communities is the result of glacial advances and recession.

Climate - The amount and pattern of rainfall, snowfall, and average temperatures play a major factor in vegetation species and patterns.

Soils - Soil development is a function of climate, parent material, topography, and vegetation. Soil characteristics and drainage, in turn, are major influences on plant distribution and productivity.

Natural Disturbances - The influence of insects, diseases, wind, and landslides have a profound effect on the structure and composition of vegetation in Southeast Alaska. They are widespread, low intensity, natural disturbance factors shaping forested vegetation in the Northwest Baranof Project Area. Furthermore, the lack of natural fire has also been a major factor in influencing the vegetative conditions in the area.

Ecological processes are not independent, but rather combine to create the environmental conditions which are the basis for the plant species and vegetative patterns in Southeast Alaska. Most of the Northwest Baranof Project Area is old growth. The islands of Southeast Alaska provide important habitat for plants and animals, yet rarely in any archipelago are populations of all species found on all islands. Factors such as island size and distance to other islands and the mainland, influence the ability of a species to successfully colonize islands. Behavior and ecological relationship factors are also thought to influence animal species distribution. For example, Baranof Island supports brown bear but not black bear populations. Some Southeast Alaska islands have populations of gray wolves, while Baranof does not. The presence or absence of gray wolves has an important influence on the distribution and abundance of other species such as Sitka black-tailed deer (USDA Forest Service 1991).

Physical and Biological Environment

Physical Geography

The Northwest Baranof Project Area is dominated by a very wet maritime climate and is exposed to outer coast storms and weather. Winter snowpack at low elevations is generally low compared to inland areas. Mountain glaciers and ice fields occur along the divide between the east and west side of Baranof Island. Baranof Island is the most rugged of all the islands in Southeast Alaska and is highly dissected by streams and rivers. These characteristics strongly influence the topography and ecology of the Project Area.

The present topography of the Project Area is largely the result of geologic uplift and glaciation. Deformation, metamorphism, and intrusion of thick sequences of interbedded sediments and major volcanic intrusions formed the gross topography. Extensive glaciation modified the topography forming cirque basins, U-shaped valleys, till plains, hanging valleys, outwash plains, and fjords. Mainland ice moved down from continental ice fields via rivers to cover all but the highest elevations. Faults channeled ice flows into valleys, deepening and broadening the existing features. Minimum elevation of ice cover was generally between 2,600 and 3,600 feet on islands and 6,500 to 8,200 feet on the mainland. Maximum retreat of the ice sheet occurred 6,000 to 8,000 years ago when mean annual temperatures were about 1 °F warmer and precipitation was much less. Melting of the ice sheet caused sea level to rise, inundating many glacial valleys and depositing marine terraces well above present sea level. Many valleys are still inundated, forming waterways and harbors. Uplift of the land after glacial retreat exposed numerous marine terraces. This uplift has ranged from 60 to 500 feet (Martin et al. 1995).

Post-glacial volcanic eruptions are limited to Kruzof Island. The best documented eruption of Mt. Edgecumbe and associated craters occurred 9,000 years ago. Thick deposits of ash and small ejected rock fragments (lapilli) were windblown as far east as Sitkoh Bay (southeastern Chichagof Island), but are most concentrated on Kruzof, southwestern Chichagof and northwestern Baranof islands (Martin et al. 1995).

Geology

The geology in the Project Area has been investigated on numerous occasions. The U. S. Geological Survey studied the area in the 1960s under the direction of Robert A. Loney and David A. Brew. They completed their report in 1975. Loney and Brew identified the rocks within the Project Area as primarily Triassic and Jurassic amphibolite, phyllite, greenstone, greenshist and graywacke (Loney 1975).

Brew (1992) indicated that no limestone bedrock were identified in the Project Area during his field work for the U. S. Geological Survey. The only such occurrence of

limestone found by his crews is at the head of Katlian Bay. However, during field reconnaissance for the Northwest Baranof Project the Forest Service found a small deposit of limestone on the ridge between the head of Fish Bay and Nakwasina Passage. The deposit appears to be a small sequence of interbedded limestone, graywacke, phyllites and mudstones, extending 500 to 1,000 feet along a north-northwest strike and estimated to be 200 to 250 feet in width. The bedrock has been tipped vertically and is covered by moderate to deep volcanic ash deposits. Minor karst features were observed, as were a few sinkholes, of which the largest was approximately 20 feet across and 15 to 20 feet deep.

No major geologic structures (faults) have been identified during past U. S. Geological Survey reconnaissance.

Mining/Mineral Potential

The Project Area does not have an active mining history. The only portion of the area to experience mineral activity is Rodman Bay. Mineral occurrence here was limited to small, low-grade, sulfide bearing quartz and calcite stringers interlaced in slate (Wright, 1904, 1906). The deposit was located in 1898 and explored through 1903. A vast amount of money was invested in the mine. Underground workings, a 120-stamp mill and a narrow-gauge railroad were developed. By late 1903 the mine had played out; it closed in early 1904. There is no recorded production from the mine. The locations were patented in 1902 and 1903, and are private lands.

The U. S. Bureau of Mines and the U. S. Geological Survey (Brew and others, 1991) have evaluated the mineral potential for most of Southeastern Alaska. They have identified areas to the west and south of the Project Area as having a high mineral potential for precious and base metals and some strategic minerals, however the mineral potential within the Project Area is considered low.

Caves

The **Federal Cave Resources Protection Act of 1988** requires that "significant" caves located on Federal lands be preserved and protected for the perpetual use, enjoyment and benefit of all people. It defines a cave as: "any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made. Such term shall include any natural pit, sinkhole, or other feature which is an extension of the entrance." Caves and cave resources generally occur in areas of karst topography, or areas underlain by soluble rock, principally limestone.

Limestone (carbonate) bedrock has been located within the Project Area in a small deposit on the ridge between the head of Fish Bay and Nakwasina Passage. We surveyed this area for caves and observed karst topography as well as a few sinkholes. No caves were located. However, we identified one sinking spring in this area. Hydrology in karst topography is unique and groundwater channeling unpredictable. Further investigation such as dye testing is needed to determine what adjacent areas are connected to this spring (see Baichtal 1993).

3 Affected Environment

Climate

The Northwest Baranof Project Area lies in the Southeast Alaska maritime climate region. Mean annual temperature is 40°F. Average annual precipitation ranges from 90" to 220" on Baranof Island.

On the Chatham Area of the Tongass National Forest, mean annual snowfall averages 40 inches at sea level, 100 inches at lower elevations of the islands, and 200 inches on the mountain peaks. Most snowfall occurs between December and March. Snowfall is highly variable in amount and persistence from year to year, especially at low elevations along the coastline. In general, on northern aspects and the eastern sides of the large islands snowfall is greater and persists longer than on the southern aspects or seaward sides of the islands. During mild winters, coastal low elevation areas may remain snow free (Martin et al. 1995).

Prominent low pressure systems cause frequent fall and winter storms which often result in blowdown of forest stands. Prevailing wind direction is strongly influenced by local topography (Martin et al. 1995).

The growing season, measured as number of days with minimum temperature above 32 °F and maximum temperature above 40 °F, averages 186 days at the Sitka Airport. Average maximum temperatures during the summer growing season range from 55° F to 66 °F. Day length varies from 7 hours during the winter to about 18.5 hours during the summer. Summer daily temperature fluctuations are reduced due to long day lengths and continual cloud cover. Daily winter fluctuations are moderated by low sun angle and cloud cover (Martin et al. 1995).

Soils

Soils on northwest Baranof Island are found on a variety of terrains shaped by glaciation and characterized by U-shaped valleys with mountains extending 2,000 to 3,000 feet above sea level. Glacial till of variable thickness occurs in the valley bottoms and up to 1,500 feet on the sideslopes. Many of the valleys have numerous rocky knobs scoured by glaciation.

Soil Development

High levels of rainfall, cool maritime temperatures, and moderately low yearly soil temperatures influence soil development in Southeast Alaska. Under these conditions, vegetative debris decomposes slowly, resulting in a thick layer of organic material. In general, the characteristics of the parent material, topography, vegetation, and climate influence the features of soils that affect and are affected by timber harvest activities. Soils in the Northwest Baranof Project Area are influenced by the following:

- the overall vegetation composition
- water quality
- riparian area and wetland functions and values
- productivity of timber, fish, and wildlife.

Soil Productivity

Soil and its productivity are critical elements, since they also affect the productivity of most other forest resources. Tree growth and wildlife and fish habitat are often associated with soil productivity (the soil component of long-term site productivity), which is the inherent capacity of a soil to support the growth of specific plants or plant communities (FSM 2554.03). In the Project Area, productivity of mineral soils ranges from very high to low. Timber site productivity on poorly and very poorly drained organic soils, regardless of elevation or northern extent, is generally much lower than the productivity of mineral soils.

Because of the importance of organic matter on forest productivity, maintaining the organically enriched topsoil layers is critical for maintaining long-term site productivity. Soil productivity and its related nutrient content can be influenced in a number of ways by timber management activities. Removal of the surface layer may be caused by landslides, surface erosion, severe yarding disturbance, or from displacement by roads, skid trails, landings, or rock pits. Soils can also be damaged by puddling, which impairs soil porosity and drainage, and therefore reduces productivity. Changes in soil productivity that last beyond the planning period are considered to be significant impairments. Fifteen percent reduction in inherent soil productivity potential is the threshold for setting values for change in measurable or observable soil properties associated with long-term productivity (FSM 2554.03).

Soil Erosion

Two major types of erosion occur within the Project Area: surface erosion and landslides.

Surface Erosion

Most undisturbed soils in the Project Area are resistant to surface erosion because they are generally protected by the surface layers of organic matter and the roots of vegetation. When mineral soils are exposed, however, erosion can occur. The rate of erosion depends primarily on the amount of vegetation ground cover, erodibility of the soil and the steepness of slope. Surface erosion and mass wasting are most likely to occur along stream banks, snowslide or avalanche slopes, and within V-notches. Timber harvest activities and road construction may increase the erosion rate by exposing mineral soil.

Landslides

Landslides are the dominant process of natural erosion in Southeast Alaska. Many landslides occur during or immediately after periods of heavy rainfall when soils are saturated. Landslides usually occur on steep slopes that have soils with distinct subsurface "slip" layers (slip-planes), such as compact glacial till or bedrock that slopes parallel to the ground surface. These areas have a high likelihood of landslides. Landslides may occur naturally, or may be caused by blasting rock, road construction, or logging practices.

Vegetation, particularly tree roots, seems to have a stabilizing effect on slopes, but tree roots tend to significantly decrease in strength five to seven years after a tree is cut (Swanston 1989). This decrease in soil holding capacity results in an increased likelihood of soil movement on steep slopes following clearcutting. Effects of partial cutting on slope stability in Southeast Alaska are relatively unknown. Under natural conditions, windthrow is an important triggering device of landslides in Southeast Alaska.

The Forest Service rated soil landtype mapping units using the Chatham Area Integrated Resource Inventory Mass Wasting Interpretation (Forest Service 1990). We used landslide mass movement hazard (MMHaz) ratings to group soil map units that have similar properties with respect to the stability of natural slopes. There are four classes of mass movement hazard: 1 (low), 2 (moderate), 3 (high), and 4 (extreme). We assign these classes to soil map units according to their relative potential for landslides, as indicated by their physical properties.

Naturally unstable soils are common throughout the Project Area. Parent material is used as an indicator of relative soil stability. Soil formed from volcanic ash is one of the factors that contribute to a high potential for mass failure. Volcanic ash has a higher inherent potential to fail than any other parent material type found in the Northwest Baranof Project Area. Table 3-2 shows total acreage of each mass movement hazard rating in the Project Area by VCU. MMHaz ratings are based on general characteristics of typical soil map units.

Table 3-2
Total Area of Each Mass-Movement Class (by VCU and in Acres)*

VCU	Low	Moderate	High	Extreme	Total Acres*
287	10,086	17,812	10,083	4,175	42,156
288	1,923	3,357	1,362	444	7,086
289	1,848	3,267	2,199	1,243	8,557
290	1,219	2,352	1,034	654	5,259
291	5,345	3,601	2,286	769	12,001
292	8,326	4,372	7,735	3,868	24,301
299	3,829	1,721	13,585	4,261	23,396
300	2,654	4,075	4,770	1,184	12,683
301	1,264	874	2,833	724	5,695
302	2,319	7,394	3,124	1,145	13,982
Total	38,813	48,825	49,011	18,467	155,116

* Does not include lakes.
Source: Huecker 1993.

Vegetation

The natural vegetation of northern Southeast Alaska is predominately old-growth coniferous forest interspersed with alpine tundra, peatlands (muskeg), shrublands, estuarine, and beach fringe plant communities. Permanent ice, rock, and persistent snowpack in some areas provide a striking contrast to the mosaic. Differences in vegetation can largely be explained by varying soil drainage conditions. The distribution of vegetation is also affected by temperature, elevation, and disturbance (Martin et al. 1995).

Five evergreen tree species occur within the Project Area: western hemlock, Sitka spruce, mountain hemlock, yellow cedar, and shore pine. Tree species composition varies by location, topography, drainage, soil type, and stand history. Black cottonwood, red alder, and other hardwoods also occur. Red alder is used locally for firewood, carving, and smoking fish. Alders are capable of fixing atmospheric nitrogen and so are valuable in improving soil fertility. Trees on noncommercial forest land are predominantly hemlocks, cedars, and shore pine (Harris and Farr 1974).

Blueberry, rusty menziesia, devil's club, and salmonberry are the most widely distributed shrubs. Five-leaf bramble, bunchberry, fern-leaf goldthread and heart-leaved twayblade are the most widely distributed forbs. Deer fern and oak fern are the most common ferns. Non-vascular plants such as mosses, lichens, and liverworts are also abundant in the Project Area (Martin et al. 1995).

Open forest stands grow mainly on organic soils. Stands of this type which contain less than 8,000 board feet of timber per acre are presently classed as noncommercial or "scrub" stands. Trees in these stands grow slowly and are often stunted. Yellow cedar, mountain hemlock, shore pine, and Sitka spruce are important species in this forest community. The open canopy allows sufficient light to reach the forest floor to support dense understory vegetation of blueberry, huckleberry, rusty menziesia, other tall shrubs, and numerous small vascular plants. These stands are important wildlife habitat (Harris and Farr 1974).

Above timberline, the alpine zone is dominated by heaths, grasses, and other low plants. Plants such as deer cabbage cover wide areas and form excellent summer range for deer. Occasional trees occur, often with stunted or shrub like form, due to adverse growing conditions. Timberline generally varies in elevation from 3,000 feet in the south to 2,500 feet in the north, but may be depressed because of differences in climate, topography, and other factors which influence snow accumulation, storage, and avalanching. The alpine area provides many fine recreation and scenic opportunities (Harris and Farr 1974).

Old-growth Forests

Most of the commercial forest land in the Northwest Baranof Project Area is considered old growth. Old-growth stands are those in which the majority of the trees are more than 150 years old. Old-growth stands exhibit wide variance in structure and species composition. Much of the timber in these climax stands is of declining commercial quality, although it is suitable for the production of pulp and lumber.

Uneven-aged, old-growth stands contain trees of a wide range of sizes, from seedlings and saplings to large, mature overstory trees, as well as a high proportion of dying trees and snags. Trees decay and die with age, and stands advanced in age become more defective. As trees die, openings are created in the overstory in which new growth may become established; in stands with these characteristics, death and regrowth is a continual process.

Table 3-3 indicates existing old growth acres by VCU and the amount of old growth required to meet the wildlife habitat retention requirements in TLMP. The retention provision in TLMP is intended in part for managing wildlife and fish habitats on the Tongass National Forest. Certain species find optimal habitat in old-growth forest for all or a portion of their life requirements, for these species, it is important that forest management maintain uneven-aged old growth forest.

Old-growth forest conditions to meet the needs of old-growth dependent wildlife species have been considered within the Project Area. Habitat for these species will be maintained in beach fringes, estuary fringes, Class I and II stream riparian buffers, key deer winter areas, and in areas managed especially to provide habitat to meet viable population needs for these species in general, and for goshawk in particular.

Table 3-3
Old Growth Acres by VCU

VCU	Existing Old Growth	TLMP Retention Acres*
287	13,584	1,121
288	2,245	84
289	3,009	296
290	1,587	235
291	5,710	293
292	8,607	446
299	2,889	194
300	5,167	2,156
301	2,405	234
302	6,448	2,119
Total	51,651	7,178

Source: Hartmann 1995.
* Acres designated in TLMP to be retained.

Even-Aged Stands

Even-aged stands result from major natural events such as windthrow, landslides, and fire. Old-growth stands, may also be returned to an even-aged stand condition by timber harvest. Within the Project Area, the even-aged, old-growth and second-growth stands

are results of windthrow, landslide, and past timber harvest. Fire has had little effect. Even-aged stands contain trees of relatively uniform age and size. These trees are vigorously growing and have few dead and dying trees. Over time, even-aged stands may convert naturally to uneven-aged stands as trees mature, die, and new growth becomes established in the openings. Timber management prescriptions may also be designed to maintain uneven-aged stand conditions.

Natural Disturbances

Natural disturbances provide the mechanism for changes in forest structure and composition. Disturbances have an effect on forest development by removing the vegetation, thus creating new growing spaces for other species to occupy. Forest composition is strongly influenced by disturbances, since natural and human disturbances occur in all forests and tree species generally have longer potential life spans than the intervals between large disturbances (Dougan 1994).

The most common forms of natural disturbance in Southeast Alaska are windthrow, mass wasting, and flooding. Fires rarely occur due to the cool, marine climate. Relatively frequent, low magnitude, natural disturbance maintains the uneven-age structure of the old-growth vegetation by creating gaps which seedlings can exploit. Low intensity disturbance commonly results from windthrow, insect infestation, disease, or small landslides (Martin et al. 1995).

Forest Diseases

All forests are subject to disease. Disease causes a loss of merchantable volume through death, decay, reduced growth rates, and decreased seed viability. Decays are of primary importance since the stands are essentially old growth. Western dwarf-mistletoe and a complex of low level endemic diseases are of lesser economic importance (Laurent 1974).

Losses from tree diseases are high principally because of the old-growth structure of our forests. As trees mature and their vigor declines, they become more subject to disease. Conifers less than 100 years old have little decay. After 100 years, the probability of a tree having rot increases rapidly. By 200 years, 65 percent of the cedar, 50 percent of the hemlock, and 20 percent of the spruce contain some rot (Harris and Farr 1974).

Decay caused by heart and root rotting fungi is probably the greatest single cause of volume loss in the forest of Southeast Alaska at this time. The decays not only cause losses due to destruction of wood, but also increase logging and milling cost and complicate management by introducing errors in yield and cruise computations (Laurent 1974).

Western dwarf-mistletoe is the most important stem disease. Although dwarf-mistletoe produces some of its own food, its nutrients are obtained from its host. This reduces vigor, growth, and quality of hemlock. Sitka spruce is rarely infected. Mistletoe can best be controlled as the mature stands are harvested. Clearcutting and the removal of all infected residuals effectively control its spread. In young stands, mistletoe is not a serious problem except where infected trees are left after logging. Periodic thinning and removal of infected stems may control the spread of mistletoe in young stands.

Over the years as old-growth stands are converted to young growth, losses from disease will decline, and potential of sites for producing wood products will be more fully realized. An extensive forest disease survey of young, well-stocked stands found them to be in generally good health (Harris and Farr 1974).

Yellow Cedar Decline

Decline and mortality of yellow cedar is the most spectacular forest problem in Southeast Alaska. Cedar decline is evident within the Project Area. Areas of heaviest decline occur along the western edge of Duffield Peninsula, the general area of Fish Bay, and in areas south of Fish Bay to St. John Baptist Bay. In most cases, it appears that yellow cedar decline is tied to soil drainage. Areas of heaviest decline appear to be associated with poorer soil drainage. As trees die, soil moisture further increases, exacerbating the problem. It is evident that decline has been occurring for a long time. Many areas have standing and down dead cedar with a relatively vigorous understory.

Wind

Wind is probably the single most important agent of natural disturbance within forests in Southeast Alaska. Large-scale blowdowns, though very destructive, occur relatively infrequently; smaller-scale wind events, which result in the loss of one to several trees, occur on a relatively frequent basis. Winds can cause both uprooting of the tree and snapping of the stem or branches. As trees continually grow taller and develop wider crowns, they become increasingly more susceptible to wind. Trees build up resistance to winds from the prevailing direction as they grow. Winds that blow trees over are unusually strong for that region, affect trees that have recently become exposed, or come from an unusual direction. The immediate effects of winds are to make growing space available by removing shade and killing tree roots. Overturned trees create hummocky soil conditions and mixed soil horizons, creating raised, mineral seed bed micro sites suitable for germination of tree seedlings; Sitka spruce is particularly adapted to this mechanism for seedling germination (Dougan 1994).

Wind has played a major role in the development and maintenance of forest stands within the Northwest Baranof Project Area. Generally speaking, large-scale blowdowns are absent from the area. The major wind disturbance mechanism has been one of frequent smaller-scale events creating canopy gaps through either windthrow or snapping out of tree tops. This has resulted in the majority of the Project Area being in an uneven-aged condition, with this structure maintained through the frequent low-intensity disturbances associated with wind (Dougan 1994).

Landslides

Landslides are an important agent of disturbance in Southeast Alaska forests. Landslide tracks are common throughout Southeast Alaska. Though landslides generally occur with less frequency than windthrows, they result in more dramatic and visible disturbance effects. Landslides generally remove all buried seeds, advanced regeneration, stumps, and other organic matter and expose mineral soil material or bare rock in the area. In Southeast Alaska, landslides are often associated with steep, highly dissected mountain slopes. Trees are commonly swept away from these sites. Pioneer or disturbance species such as Sitka alder, salmonberry, devil's club and stink-currant may tend to dominate these sites for many years (Dougan 1994).

Floodplains, Wetlands, and Riparian Areas

Like much of Southeast Alaska, the Northwest Baranof Project Area contains a large proportion of floodplains, wetlands, and riparian areas. Approximately 4,387 acres (3 percent) of the Project Area is classified and mapped as floodplain, and 53,947 acres (38 percent) as wetland. Table 3-4 displays the acreage and distribution by VCU of floodplains and wetlands in the Northwest Baranof Project Area.

Floodplains and wetlands are recognized as uniquely sensitive, high value ecosystems and they have been identified in law and regulation as requiring special management. Each of these areas is strongly influenced by either the periodic, persistent, or peripheral presence of fresh water. As a result of this hydrological relationship, each area has a unique set of soil, water, and vegetative characteristics and requires a unique set of management considerations.

Federal agencies are required to avoid, to the extent possible, activities which might result in negative effects associated with the occupancy or modification of these areas. The actions we propose in the Northwest Baranof Project Area minimize activities in the floodplains and wetlands.

Floodplains

Executive Order 11988 directs Federal agencies to:

- avoid the direct or indirect support of floodplain development whenever there are practicable alternatives
- evaluate the potential effects of any proposed action on floodplains
- ensure planning programs and budget requests reflect consideration of flood hazards and floodplain management, and
- prescribe procedures to implement the policies and requirements of the Order (USDA Forest Service 1991).

Floodplains are composed of sediment carried by a stream or river and deposited in slow water sections of channels during floods. Floodplains are defined as areas subject to a one percent (100-year recurrence) or greater chance of flooding in any given year. Floodplains are generally associated with larger streams such as Rodman Creek, Fish Bay Creek, and Nakwasina River. Consequently, floodplains are usually associated with Class I streams and larger Class II streams, and are rarely associated with Class III streams. Nutrient-rich sediments underlain by coarse-textured sediments make floodplains the most productive lowland timber, wildlife, and fisheries resource sites in the Northwest Baranof Project Area (USDA Forest Service 1991).

The floodplains within the Northwest Baranof Project Area are typically found in broad, flat, alluvial U-shaped valleys. They usually support plant communities having an overstory of Sitka spruce, or Sitka spruce and western hemlock. The shrub understory is variable and may include blueberry, skunk cabbage, devil's club, salmonberry, and alder. The herb understory is dominated by ferns and broad leaf plants (USDA Forest Service 1991).

Flooding may occur in a variety of land types, including steep, narrow mountain canyons; wide, flat alluvial valleys; lake shores; coastal areas; and alluvial fans. To date, no known area-wide flood hazard or flood insurance studies have been conducted in the Project Area. Soils and landform inventory data are the only available information for making initial determinations of the location and approximate boundaries of floodplain areas (USDA Forest Service 1991).

Wetlands

Executive Order 11990, as amended, requires Federal agencies that exercise statutory authority and leadership over Federal lands to avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands. Where practicable, we must avoid direct or indirect support of new construction in wetlands. We are required to preserve and enhance the natural and beneficial values of wetlands in carrying out our responsibility for 1) acquiring, managing, and disposing of lands and facilities; 2) providing federally undertaken, financed, or assisted construction and improvements; and 3) conducting federal activities and programs affecting land use. Section 404(f)(1)(A) and (E) of the Federal Clean Water Act specifically exempts silviculture, timber harvesting, and related road construction activities from permit requirements for the discharge of dredge and fill material in wetlands (USDA Forest Service 1991).

The Army Corps of Engineers (ACOE) and the Environmental Protection Agency (EPA) jointly define wetlands as: "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (ACOE 1987)."

These two agencies (ACOE and EPA) signed a Memorandum of Agreement that provides clarification and general guidance regarding the level of mitigation necessary to demonstrate compliance with the Clean Water Act in connecting with standard Section 404 dredge and fill permits. The President's Domestic Policy Council is charged with developing recommendations regarding the attainment of the goal of "no net loss" of the Nation's wetlands. This Council will consider the challenges posed in Alaska, a state where a high proportion of developable land is wetlands and where technical difficulties exist regarding opportunities for compensatory mitigation. Our objective is to support the President's Domestic Council assignment during project planning (USDA Forest Service 1991).

The Forest Service (DeMeo and Loggy 1989) has developed wetland identification procedures specific to Southeast Alaska's vegetation communities. This procedure evaluates the vegetation and soil layers of the GIS database and then assumes the presence of the wetland hydrological criteria. This work was based in part on a U. S. Fish and Wildlife Service report on classification of wetlands and deep water habitats (Cowardin et al. 1979).

Wetlands influence flood flow moderation, groundwater recharge and discharge, wildlife and fish habitat, and water quality. In the Northwest Baranof Project Area, wetlands range from sea level to alpine. They include forested sites on poorly and very poorly drained organic soil, and poorly and somewhat poorly drained mineral soils. Nonforested or open sites of herbaceous plants are found on poorly and very poorly drained organic soils (muskegs). The wetlands within the Northwest Baranof Project Area are classified into four basic wetland systems:

- estuarine wetlands, and
- muskegs, scrub-shrub, and forested wetlands (described below); and
- lakes and ponds, and
- river and stream wetlands (described in the Water section).

Estuarine Wetlands

Estuarine wetlands (estuaries) are those land areas that are predominantly intertidal, and are those parts of the rivers or streams or other bodies of water having an unimpaired connection with the open sea, where the sea water is diluted with fresh water derived from land drainage. Since the Forest Service is not chartered to manage ocean areas, the Forest's wetland inventory data does not cover the areas below mean-high tide (USDA Forest Service 1991). For the Northwest Baranof Project Area the estuaries include over 2,437 acres. Estuaries comprise approximately 5 percent of the inventoried wetland acres in the Project Area. These acres include areas mapped as both intertidal mudflats and emergent estuaries and are derived from the Common Land Unit (CLU) layer in GIS (USDA Forest Service Land System Inventory (LSI) Draft User Guide).

These estuaries are characterized by sparsely vegetated mud flats inundated daily by moderate and high tides; by sedge marshland inundated by high tides; and by mixed forb grassland inundated only by extremely high tides. The upland portions of the estuaries are dominated by highly productive sedge communities and the emergent areas by diverse compositions of fescue, grass, and mixed forb plant associations (USDA Forest Service IRI MUD).

Estuary streams may have either single or multiple channels. These channels are low gradient and shallowly incised. Most of these channels are comprised of fine silt or sands, but they may also possess bedrock, boulders, cobbles, and coarse gravel. Although estuary streams are rated as being well confined and having excellent containment, they may overflow their banks during periods of flooding. The mineral soils of the estuaries are a result of deposition by these associated estuary streams (USDA Forest Service 1990, AMS for TLMP Revision).

Muskegs, Scrub-Shrub Wetlands, Forested Wetlands (Palustrine Wetlands)

Palustrine wetlands include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. Palustrine wetlands comprise approximately 94 percent of the inventoried wetland acres in the Northwest Baranof Project Area. Three general classes of palustrine wetlands have been identified for the Northwest Baranof Project. These include muskegs, scrub-shrub wetlands, and forested wetlands (USDA Forest Service 1991). These three classes are described below.

Muskegs - Muskegs, the most unique and distinct of the palustrine wetlands, comprise 43 percent of the inventoried palustrine wetland acres and 40 percent of the total mapped wetland acres within the Northwest Baranof Project Area (Table 3-4). The term "muskeg" denotes a bog in the northern part of North America, characterized by an abundance of sphagnum moss and greater or lesser abundance of shrubs and low trees. In Southeast Alaska, all relatively open bogs that have a ground cover high in sphagnum mosses and/or sedges are called "muskegs" (USDA Forest Service 1991).

Muskegs in Southeast Alaska have poorly drained organic soils that range from less than 2 feet to over 40 feet. Depending on the muskeg type, the soil may consist of decomposed remains of sphagnum moss, sedges, shrubs, forbs, and wood. Vegetation growing on muskegs relates to the organic material present, which in turn is related to the near-surface water table and its movements. Muskegs may be associated with lakes or streams. Streams associated with muskeg ecosystems generally will have a single, low gradient, confined channel (USDA Forest Service 1990 TLMP Revision AMS).

Scrub-Shrub Wetlands - Scrub-shrub wetlands are the most vegetatively varied wetland in Southeast Alaska. They comprise approximately 20 percent of the inventoried palustrine wetland acres and 19 percent of the total mapped wetland acres within the Northwest Baranof Project Area (Table 3-4). Soil drainage on these wetland areas, depending on soil type, ranges from poorly to very poorly drained. They are dominated by woody vegetation less than 20 feet tall, depending on the plant association. Plant species may include true shrubs, young trees, and trees and/or shrubs that are small or stunted because of environmental conditions. Scrub-shrub wetlands in the Northwest Baranof Project Area are associated with two broad wetland plant communities: scrub-shrub evergreen/muskeg, and forested scrub-shrub evergreen/muskeg (USDA Forest Service 1991).

Forested Wetlands - Forested wetlands comprise approximately 37 percent of the inventoried palustrine wetland acres and 34 percent of the total mapped wetland acres in the Project Area (Table 3-4). Soil drainage, depending on soil types, ranges from somewhat poorly to very poorly drained. Vegetation ranges from scrubby mixed conifer forests on the poorly drained sites to moderately productive mixed conifer, western or mountain hemlock stands on somewhat poorly drained sites. Shrubs and forbs dominate the under story. Like muskegs, these forested wetlands may be associated with either streams or lakes, but for the most part these wetlands are simply associated with wet ground. (USDA Forest Service 1991).

Table 3-4
Wetlands (in acres)

VCU	Estuaries	Lakes/Ponds	Muskegs	Scrub/Shrub	Forested Wetlands	Total Wetlands
287	697	237	8,046	2,650	7,297	18,927
288	151	45	2,673	205	1,463	4,537
289	202	3	1,191	531	1,840	3,767
290	13	3	926	501	986	2,429
291	233	9	1,509	348	650	3,749
292	428	6	1,529	2,256	514	4,733
299	280	273	528	1,801	705	3,587
300	267	74	1,379	366	1,815	3,901
301	55	8	298	281	484	1,125
302	111	235	3,867	151	2,829	7,192
Total	2,437	893	21,946	9,090	18,583	53,947

Source: Thomas 1995

Riparian Areas

Riparian ecosystems are the areas between the water and the land. Riparian areas are directly influenced by water, and include trees and other plants that live and grow near water on the banks of streams, rivers, and lakes. The vegetation under the trees is usually abundant, with a wide variety of shrubs, grasses, and wildflowers. Riparian zones are extremely important habitat for brown bear, eagles, ducks, geese, beaver, and marten.

When flood water overflows the banks of a stream or river, riparian vegetation slows the flood water so that it can no longer carry its load of sediment and the sediment settles out. The vegetation quickly grows through this sediment, stabilizing it with roots and covering it with plants that use the nutrients that could otherwise harm downstream water quality. Riparian areas also filter runoff and sediment from slopes next to the stream (USDA Forest Service 1990).

Healthy riparian areas act like a sponge and take in water readily. Water slowed by riparian areas enters the groundwater and some of it is released later, increasing late summer and fall stream flow. Riparian areas produce an abundance of cover and shade. The shade keeps water temperatures cool for fish and water-loving animals. The vegetation cover provides shelter, food, and temperature relief for many birds and other animals (USDA Forest Service 1990).

Present Condition

Existing pristine riparian areas on the Forest are in very good condition. They support, for the most part, old-growth riparian habitat and associated dependent species. Riparian ecosystems harvested for timber are now in various states of regeneration. Roads constructed in riparian areas have converted these sites into a non-productive status. Except where the ground is highly disturbed, the stand composition on these regenerating riparian areas is very similar to the riparian vegetation prior to timber harvest with spruce, hemlock and cedar forming the tree canopy (USDA Forest Service 1991).

Water

The Northwest Baranof Project Area is characterized by an abundance of water. This low elevation, coastal rain forest lies within the area affected by the dominant maritime climate of Southeast Alaska. This climate produces heavy precipitation and relatively cool summers and mild winters. The result is great quantities of water falling, primarily as rain at lower elevations and snow at the higher elevations. This precipitation is the source of the many rivers, streams, lakes, ponds and wetlands in the Project Area. These water resources are important for the vegetation, wildlife, fish, subsistence, recreation, and scenic resources of the area.

Rivers and Streams

The Northwest Baranof Project Area includes approximately 17 major watersheds whose streams terminate at saltwater. These watersheds contain over 391 miles of inventoried rivers and streams. Important watersheds include Rodman Creek, Fish Bay Creek, and Nakwasina River.

Stream Flow

Stream flow is an important characteristic of the rivers and streams. The average annual precipitation within the Project Area varies spatially and with elevation due to the effects of mountains. Similarly, streamflow varies in response to precipitation.

There are two yearly peak streamflow periods; one occurs in the spring during the snowmelt season and the other during the heavy rains of fall. Lakes and permanent snowfields are important reservoir features in several basins. These features provide storage capability that helps regulate the annual streamflow.

Most rivers and streams in the Project Area possess stream characteristics and channel morphology that reflect natural processes and show no apparent impact from past human activities. Others display obvious modifications and effects of the historic logging that occurred in and around these channels. Furthermore, high bedload in stream channels resulting from landslides have also affected many stream channels in the Project Area.

Muskegs and riparian zones store water and act as sediment traps along many streams in the Project Area. Water stored in these areas is released over time and maintains baseflow in streams. In watersheds with wider floodplains and riparian corridors, bedload and sediment delivered from high-gradient V-notch channels is often trapped before entering the mainstem channels of streams, minimizing the impact of landslides on stream habitat.

Water Quality

Water quality within the Project Area is generally good. Stream chemical components and water temperatures for all drainages in the Northwest Baranof Project Area are within standards established for the growth and propagation of fish by Alaska State water quality criteria (ADEC, 1989). There are 112.3 total miles of existing road (including spur roads) in the Project Area. Of these, 77.8 miles are located within riparian habitat. Culvert and bridge failures have occurred along the roads in several VCUs resulting in

sedimentation (e.g., Nakwasina River, Fish Bay, Adams Creek). Sedimentation is not a significant problem in most Northwest Baranof watersheds. Rodman Creek and Nakwasina River are listed on the EPA's Impaired Watershed List under the "Suspected" category, due primarily to riparian zone timber harvest which occurred in the past. Spawning gravel quality, fish habitat diversity, and channel stability have been impacted by previous riparian logging and road construction activities.

Lakes and Ponds

The lakes in the Project Area include small muskeg ponds and alpine lakes. There are a few lower elevation lakes within the Project Area that provide sport fishing opportunities, but none with commercial importance. Unlike other areas of Baranof Island, lakes are small in relation to the total land area (Table 3-4).

Fish

Class I streams have anadromous fish habitat.
Class II streams have resident fish populations, but no anadromous fish.
Class III streams do not have fish, but influence downstream water quality and fish habitat.

The aquatic resources of the Northwest Baranof Project Area are important to the subsistence, recreational, and commercial users of Southeast Alaska. These abundant aquatic systems provide spawning and rearing habitats for salmon and resident fish. Maintenance of this aquatic habitat and associated high water quality is essential for maintaining species abundance and diversity. It is also a focal point of federal and state natural resource agencies, public and private organizations, and concerned individuals.

Anadromous fish species within the Project Area include pink (humpback), chum (dog), and coho (silver) salmon, and Dolly Varden char. Resident game species include cutthroat and steelhead trout and resident Dolly Varden char. These aquatic resource are important to sport, commercial, and subsistence useres of the area.

There are over 135 miles of Class I fish streams, 150 miles of Class II streams, and 106 miles of mapped Class III streams. Many streams in all stream classes which are less than 1 mile long remain unmapped. The unmapped streams are predominantly very small (less than 1 meter wide), mountain slope, wetland and floodplain drainages.

Stream Condition

Many watersheds were logged extensively between 1950 and 1970. A summary of impacts to several creeks and streams follows.

Rodman Creek
Soil disturbance occurred on portions of the floodplain during previous logging. Machine tracks and log skidding damaged some channels by crushing banks, introducing sediment, and removing the organic layer of the adjacent soil which increased surface erosion.

Adams Creek (also known as Rodman Bay SW)
In 1989, a 5-acre debris avalanche within a regenerating clearcut timber stand crossed Adams Creek and formed a temporary dam. The dam broke, depositing sediment and trees downstream and causing floodplain changes. Channel shifting washed out a one-acre pond near the estuary which had provided important overwinter rearing habitat for coho salmon.

In 1989, the Forest Service completed a watershed restoration project on Adams Creek (Suminski 1989). We constructed 21 LWD structures in a moderate gradient tributary channel to improve overwinter habitat for coho salmon. All structures were still functional in 1994. This work linked two ponds by a small channel to the main river, giving coho salmon and Dolly Varden char access to about one acre of productive rearing habitat. We also fertilized the five-acre landslide then planted grass and spruce trees to reestablish vegetative cover and stabilize the slope.

Fish Creek
In 1980, the Forest Service removed logging debris and natural windfall from the creek (Inghram, 1980). Some culverts on the Fish Bay road system have plugged with bedload or woody debris, resulting in erosion of road prisms. Log bridges were removed using explosives to prevent blocking fish passage should the bridges collapse.

St. John Baptist Bay
The head of St. John Baptist Bay is the site of ongoing surveys by the National Marine Fisheries Service (NMFS) to study sablefish biology. Of 67 sites surveyed in Southeast Alaska since 1986, St. John's is the only bay that had large numbers of juvenile sablefish every year.

Noxon Creek
Loggers salvaged large trees from the stream during past logging. In 1967, at the request of biologists, they removed an estimated 25,000 board feet of timber from two log jams. Roberts (1968) observed that deep pools rapidly filled with gravel after debris removal, and extensive gravel bars and rising stream beds developed downstream from the debris removal sites. ADF&G removed LWD from the first mile of the stream in 1972. Bryant, et al. (1992), reported channel scour at log removal locations. The degradation resulted in incised banks with reduced cover, relatively high stream velocities, and no usable fish habitat. Down cutting on one channel after debris removal resulted in reduced flow to a side channel, where fish get stranded in isolated pools during periods of low flows.

Nakwasina River
Nakwasina River is one of the largest fish producers in the area. It provides habitat for chum, coho, and pink salmon. Portions of the Nakwasina watershed were chemically treated with 2, 4-D spray in June 1968 to inhibit red alder growth in harvest areas. The Institute of Northern Forestry conducted bioassay experiments to determine the effect of the herbicide on Dolly Varden char, coho salmon and various aquatic insects. Meehan (1968) reported no mortalities or distress attributed to the spray.

Large Woody Debris

Fish biologists refer to downed trees and logs at least four inches in diameter and ten feet long as large woody debris (LWD). In floodplain channels, large trees with intact rootwads anchor firmly in the substrate and collect smaller logs and sticks. Generally, the more complex and numerous the wood in debris jams, the deeper the pool, and the greater the ability to support rearing fish. LWD is recognized as playing an important role in controlling channel morphology, the storage and routing of sediment and organic matter, and the creation of fish habitat. Gradual entry of LWD into the aquatic system is desirable to maintain stream habitat diversity and stability. Large amounts entering abruptly can be detrimental to the aquatic ecosystem by becoming a physical barrier and causing bank erosion and channel migration problems.

"Kingpin" LWD pieces collect smaller branches, sediment, and forest litter. Much of the nutrients entering streams are from leaves, insects and other organisms falling into streams from riparian vegetation. LWD traps these energy sources, lengthening the time they are available to the aquatic food chain. LWD also traps bedload sediments moving through the system. Stable streambeds with perennial flow are highly productive sites for aquatic insects that graze on algae covered rocks, or microorganisms that feed on debris.

Wildlife

Southeast Alaska's residents and visitors value wildlife for aesthetic, economic, recreational, ecological, and subsistence reasons. Wildlife live in a diverse range of land types and plant communities, and adapt to a variety of climatic extremes, changes in habitat, predations, and hunting pressure. One goal of the Forest Service is to provide a "continuing flow" of diverse habitats to meet the needs of a wide range of wildlife species.

The National Forest Management Act (NFMA) requires us to maintain minimum viable populations and biological diversity, and to establish management goals for species in public demand. By monitoring population changes in a few species, we can estimate the effects of our land management activities.

Wildlife Habitats

Habitat is the environment in which a species lives. We can describe this environment in physical or biological terms. Our descriptions often includes elevation, topographic position, or type of vegetation. A wildlife species may occupy a range of different habitats, or more than one distinctive kind of habitat in different seasons. We inventoried the following habitats in the Project Area (Table 3-5):

- Beach fringe
- Estuary fringe
- Riparian
- Old-growth forest
- Second-growth forest
- Alpine/subalpine

We inventoried these habitat types because of specific attributes or management concerns in relationship to each species studied (see Table 3-6). A brief description of the habitat types inventoried follows.

Beach Fringe - land within a 500-foot horizontal distance inland from the shoreline along the entire coastline (not including the area of land already within the estuary fringe).

Estuary Fringe - a 1,000-foot zone around estuaries.

Riparian - the area along rivers and streams or around inland lakes containing elements of both aquatic and terrestrial ecosystems.

Old-Growth Forests - stands of trees which are more than 150 years old, with declining growth rates and signs of decadence, such as dead and dying trees, snags, and downed woody material

Second-growth Forest - forest that has regenerated naturally after a disturbance (such as timber harvest, windthrow, or disease). Second-growth forests are typically even aged.

Alpine/Subalpine - areas at or above treeline (1,500 feet in elevation), including unvegetated areas of permanent snow and ice; open meadows of grasses, forbs, and shrubs; and scrub forest. Subalpine habitat includes a mosaic of forested, scrub, and unforested stands that occur at higher elevation than the upland forest, at the lower edge of the alpine zone (Sidle and Suring 1986).

Table 3-5
Acres of Wildlife Habitat in the Project Area in 1954 and 1994, and Percent Change

Habitat Type	Acres in 1954*	Acres in 1994	% Change
Beach Fringe	3,949	3,211	-19
Estuary Fringe	4,852	3,871	-20
Riparian	15,053	8,742	-42
Old Growth	63,858	51,651	-19
Second Growth	497	10,070	1,926
Alpine/Subalpine	30,604	30,604	0

* Acres prior to harvest under the APC Long-term Timber Sale Contract.
Source: Hartmann 1995

Wildlife Species

For this project, we studied Sitka black-tailed deer, brown bear, river otter, marten, mountain goat, red squirrel, brown creeper, red-breasted sapsucker, hairy woodpecker, Vancouver Canada goose, and bald eagle. In this Draft EIS, we will discuss primarily Sitka black-tailed deer, brown bear, mountain goat, marten and bald eagle. We selected species based on public comments received during scoping for this Project. We have included data and information regarding the other wildlife species in the Project planning record.

Sitka Black-tailed Deer

Sitka black-tailed deer range through all major habitats in the Northwest Baranof Project Area. Deer rely heavily on forested habitats for cover and much of their feeding is in forested areas. In summer, deer range through all elevations, including alpine meadows and subalpine forests. They also feed in recent clearcuts where forage is plentiful. Winter snows drive them to lower elevations and deep snow forces them to the beach fringe (Forest Service 1986). They may even feed on seaweed at low tide when most of their preferred browse is unavailable. Winter is the most limiting season for the Sitka black-tailed deer.

Brown Bear

Brown bear (referred to as a brown bear in coastal Alaska and grizzly bear in interior areas and the remainder of North America) are present in all Project Area VCUs. Records indicate the current and historical distribution of brown bear in Southeast Alaska are the same. Brown bears are present on the mainland and on the islands north of Fredrick Sound and occasionally reported on Mitkof and Wrangell Islands.

Brown bear use sea level to alpine habitats and require large areas of habitat as well as protection from human disturbance. The distribution of bears corresponds closely to the seasonal abundance and quality of food available. In Southeast Alaska, old-growth forest

is used extensively by brown bears for foraging, cover, and denning. Late summer season is the most critical or limiting period for brown bear (Schoen et al. 1992). During this season, bears concentrate along low-elevation valley bottoms and coastal salmon streams.

Mountain Goat

Historically, mountain goats in Southeast Alaska were present only on the mainland. Although capable of swimming, they did not naturally disperse from the mainland to the islands. They have been successfully introduced on Baranof and Revillagigedo Islands. Presently mountain goat populations are stable or increasing throughout their range in Alaska, and interest in hunting or observing them continues to increase (Townsend 1986).

Mountain goats use cliffs, alpine and subalpine, and old-growth forest habitats. Within the Project Area, mountain goats are commonly found in the alpine areas between VCU 292 and 287, around Annahootz Mountain, and in VCUs 299 and 301. Goat hunters commonly fly into Hemmorhoid, Rosenberg, anda Cold Storage Lakes to access goat herds. Mountain goats eat foliage and seed heads of grasses, sedges, and brushes; foliage stems, and flowers of forbs; leaves and twigs of shrubs and trees; leaves of ferns; and the entire aerial portion of mosses and lichens (Wigal and Coggins 1982). Foraging sites and forage composition change throughout the year. Hunted populations of mountain goats are sensitive to disturbance, poaching, and over harvest.

The primary considerations in the evaluation of habitat for mountain goat in Southeast Alaska are availability of food and proximity to escape terrain (Suring et al. 1988). The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska, and is the habitat most likely to be affected by forest management activities.

Marten

Marten were introduced to Prince of Wales, Chichagof, and Baranof Islands between 1930 and 1950 through cooperative transplant work between the Alaska Department of Fish and Game and the USDA Forest Service (Burris and McKnight 1973; Johnson 1981).

Martens prefer mature old-growth forests with a well-developed overhead canopy. Snags and downed woody debris are important to martens for winter and summer dens and resting sites, and for cover from prey species. The distribution and abundance of martens is determined to a large extent by the availability of cover and the presence of prey species (Simon 1980). Throughout the year, especially in the winter, small mammals are an important food source for martens. During the summer their diet is supplemented by birds, insects, fruits, and berries.

The quantity and quality of winter habitat is the most limiting factor for marten in Southeast Alaska. Winter habitats are also the habitats most likely to be affected by logging.

Bald Eagle

Bald eagles are found throughout Southeast Alaska and are primarily associated with coastal habitats and inland riparian habitats. Bald eagles may also concentrate at feeding

grounds in the spring. Throughout their range, bald eagles are opportunistic in their use of available food resources. Fish is their dietary mainstay in Southeast Alaska (Kalmbach et. al. 1964).

Typical nesting habitat occurs along the coastline in old-growth forests. The majority of nests are found in Sitka spruce trees. The U. S. Fish and Wildlife Service has identified 117 nest sites in the Project Area.

Table 3-6
Wildlife Species and Preferred Habitats

Species	Preferred Habitats					
	Beach Fringe	**Estuary Fringe**	**Riparian**	**Old Growth**	**Second Growth**	**Alpine/ Subalpine**
Sitka Black-tailed Deer	x	x	x	x		x
Brown Bear	x	x	x	x		x
River Otter	x	x	x	x		
Marten	x	x	x	x		x
Mountain Goat				x		x
Bald Eagle	x	x	x	x		
Red Squirrel				x		
Brown Creeper				x		
Red-breasted Sapsucker				x		
Hairy Woodpecker				x		
Vancouver Canada Goose	x	x	x	x		

Wildlife Analysis Areas

Much of the wildlife data is analyzed by Value Comparison Units (VCU) and by Wildlife Analysis Area (WAA). VCUs were designated by the Forest Service in the Tongass Land Management Plan (TLMP) to provide a common set of areas for planning and resource analysis. VCUs generally encompass a drainage basin or watershed. WAAs are management units delineated by the Alaska Department of Fish and Game (ADF&G). WAAs and VCUs included in whole or in part in the Northwest Baranof Project Area are illustrated in Figure 3-1 and listed in Table 3-8.

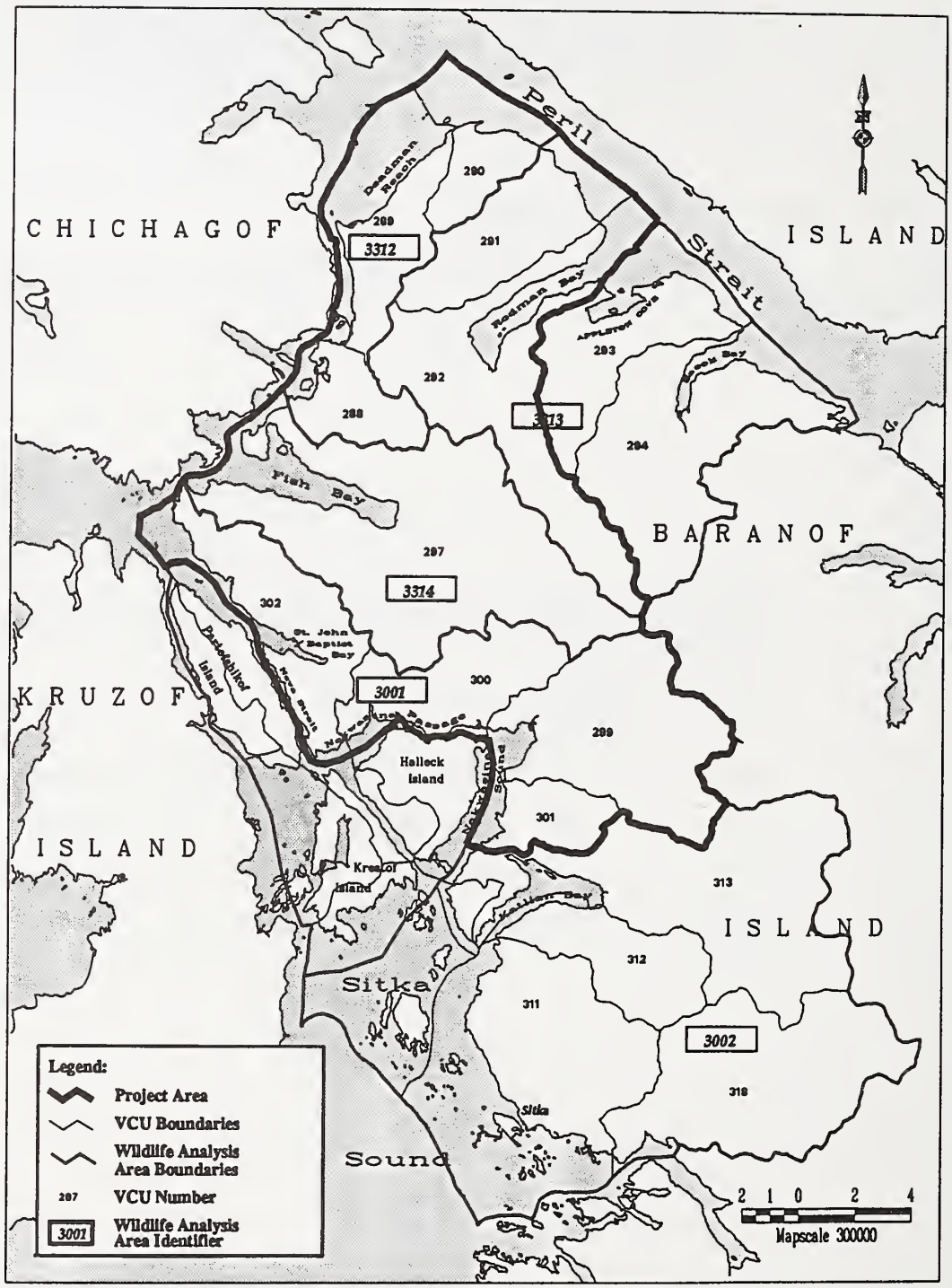
Table 3-7
Wildlife Habitat Capability Index for Project Area WAAs

Species	WAA 3001	WAA 3312	WAA 3313	WAA 3314	Total
Sitka Black-tailed Deer	1895	479	898	948	4220
Brown Bear	62	27	43	51	183
Marten	82	37	66	70	256
Mountain Goat	51	0	8	6	65
Bald Eagle	70	34	36	48	188

Table 3-8
VCUs Within Wildlife Analysis Areas (WAAs) and Percent of the WAA that the Project Area Includes

WAA	% of WAA in Project Area	VCUs in WAA	VCUs in Project Area
3001	69%	299, 300, 301, 302, 303, 309, 310	299, 300, 301, 302
3312	100%	288, 289, 290	288, 289, 290
3313	49%	291, 292, 293, 294	291, 292
3314	100%	287	287

Figure 3-1
Map of WAAs



Marine Environment

Southeast Alaska has approximately 30,000 miles of shoreline. Along this shoreline a great diversity of habitats account for the complexity of Southeast Alaska's estuarine and tidal environments. This complex and dynamic ecosystem includes shrimp, flatfish, marine worms, starfish, sponges, anemones, sea cucumbers, urchins, shellfish, plankton, marine algae, and other organisms.

Marine Fish

Sablefish

The National Marine Fisheries Auke Bay Laboratory in Juneau, Alaska conducted surveys in Southeast Alaska for concentrations of juvenile sablefish between 1986 and 1991. They found sizeable concentrations at St. John Baptist Bay. This is the only bay in Southeast Alaska in which large numbers of sablefish are found year after year. There is an inactive log transfer facility site at the head of the bay on the north side.

Herring

In 1988, ADF&G recorded 104 nautical miles of herring spawn in the Sitka area, continuing a recent expansion of the spawning range, and providing a tremendous boost to the marine food base. The Sitka sac roe fishery, which takes place partially within the Project Area, has paid fishermen up to $2,000 per ton. The 1993 harvest was 9,720 tons. Direct and indirect income is generated by the community's related industry and services.

Marine Shellfish

The shallow marine waters and associated mud flats that are found in protected coves and bays provide vital habitat for some commercially important species, such as Dungeness crab. Boes and White (1994) conducted dive surveys at previously used LTF sites and observed several shellfish species, including Dungeness crab, red rock crab, abalone, Pacific pink scallops, coonstripe shrimp, horse clams, and blue mussels.

Endangered Species

The Endangered Species Act of 1973

The Endangered Species Act of 1973 was enacted "to provide a means whereby the ecosystems upon which endangered species and threatened species may be conserved, to provide a program for the conservation of such endangered species and threatened species...." Fish, wildlife, and plants in danger of extinction (as defined in Table 3-9) are protected by this Act.

Table 3-9
Endangered, Threatened, Proposed, and Candidate Species Definitions

Endangered	Any species in danger of extinction throughout all or a significant portion of its range.
Threatened	Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range and designated threatened by the appropriate Secretary.
Proposed	Any species of fish, wildlife, or plant that is proposed by the Fish and Wildlife Service or the National Marine Fisheries Service to be listed as threatened or endangered.
Candidate	Those plant and animal species that, in the opinion of the FWS, may become endangered or threatened. The FWS recognizes three categories of candidate species for listing as endangered or threatened: **Category 1** endangered or threatened listing is appropriate, and FWS is gathering data concerning essential habitat needs (this may include precise boundaries for critical habitat designations). **Category 2:** endangered or threated listing is possibly appropriate, but conclusive data is not currently available to support proposed listing. **Category 3:** no longer being considered for listing as endangered or threatened and not regarded as candidate species.
Sensitive	A Forest Service designation for plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Wildlife

The humpback whale has been on the U. S. Endangered Species list since 1970 and occurs in most of the marine waters of Southeast Alaska. There is no designated critical habitat nor is there any area being considered for designation as critical habitat in or near the Project Area (Zimmerman 1993).

The Stellar sea lion was designated threatened on April 5, 1990. This species may occur near the Project Area. However, no critical habitats are designated in or near the Project Area at this time (Zimmerman 1993).

The American peregrine falcon may occur in the Project Area as a migrant but is not likely to be affected by activities arising from this project (Holmberg 1994). The status of the marbled murrelet is being considered and may be listed in the future. No other threatened, endangered, or sensitive species are known to occur in the Project Area.

There are five Category 2 bird species that may occur in the Project Area: marbled murrelet, northern goshawk, Harlequin duck, olive-sided flycatcher, and Kittlitz's murrelet. Marbled murrelets are common in Southeast Alaska and occur in the Project Area. They are known to nest in the thick moss on branches of old-growth coniferous trees. However, no nests have been found in the Project Area.

Northern goshawks nest in old-growth forest stands in Southeast Alaska. Forest Service crews confirmed one nest site in the Project Area and located one probable nest site. We conducted surveys in the summers of 1993 through 1995.

Harlequin duck use cold, rapidly flowing streams in forested areas during breeding season. The olive-sided flycatcher is uncommon in Southeast Alaska. This species nests in a variety of habitsts including conirerous forest, open woodland, and muskegs. Kittlitz's murrelet are uncommon in Southeast Alaska. They are known to nest in rock outcrop areas.

Fish

There are no threatened, endangered or sensitive fish species known to occur in the Northwest Baranof Project Area.

Plants

The only plant federally listed or proposed by the U. S. Fish and Wildlife Service in Alaska is *Polystichum aleuticum*, which is endangered. It is only known from Adak Island and is not expected to occur in the Project Area.

There are no plant species listed by the USFWS as endangered or threatened or proposed for listing for southeast Alaska. There are two Category 2 plant species which are likely to occur in Southest Alaska, including *Calamagrostis crassiglumis* and *Carex lenticularis* var. *dolia* (Lindell, 1993). Information concerning these plant species is limited. The USFWS is not aware of any information that indicates whether or not these plant species occur in the proposed project area (Lindell, 1993). *Calamagrostis crassiglumis* is found to occur in coastal swamps and brackish meadows. This plant has not been documented to occur on the Tongass National Forest. *Carex lenticularis* var. *dolia* is associated with wet meadows, lake shores, and snowbeds, generally at higher elevations (above 600 meters in Southeast Alaska). This plant has been documented at four sites on or adjacent to the Tongass National Forest.

There are 22 plants designated as sensitive by the Regional Forester for Region 10 of the Forest Service. Of these plants, 15 are known or suspected to occur on the Sitka Ranger District and possibly in the Project Area. They are known or suspected to occur because or their range and/or general habitat requirements. These plants are:

- *Arnica lessingii* ssp. *norbergii*, Norberg arnica
- *Carex lenticularis* var. *dolia*, Goose-grass sedge
- *Dodecatheon pulchellum* ssp. *alaskanum*, Pretty shooting star

- *Draba kamtschatica*, Kamchatka rockcress
- *Glyceria leptostachya*, Davy mannagrass
- *Hymenophyllum wrightii*, Wright filmy fern
- *Isoetes truncata*, Truncate quillwort
- *Ligusticum calderi*, Calder lovage
- *Platanthera chorisiana*, Choris bog orchard
- *Platanthera gracilis*, Bog orchid
- *Poa laxiflora*, Loose-flowered bluegrass
- *Puccinellia kamtschatica*, Kamchatka alkali grass
- *Romanzoffia unalaschcensis*, Unalaska mist-maid
- *Senecio moresbiensis*, Queen Charlotte butterweed
- *Stellaria ruscifolia* ssp. *aleutica*, Circumpolar starwort

The Forest Service conducted surveys for these plants in the Project Area. In addition to the sensitive plant species listed above surveys were also conducted for two plant species which may be added to the R-10 sensitive species list in the future. These plants are:

- *Salix reticulata* ssp. *glabellicarpa*, Netted willow
- *Botrychium ascendens*, Ascending moon wort

Most of the proposed new road corridors and harvest units with high probability sensitive plant occurrence in the Project Area were surveyed. High probability sites generally include alpine/sub-alpine habitat, avalanche slopes, swales, meadows (upper beach, dry or wet meadows), streamsides, lake margins, and rock outcrops. No Endangered, Threatened, Candidate, or Sensitive plants were found.

On-Site Human Environment

Silviculture and Timber Management

Silviculture may be defined as the art and science of manipulating vegetation to reach desired goals. Silviculture involves the theory and practice of controlling the establishment, composition, and growth of forests. We use silvicultural theories in the planning process to identify current forest conditions, to develop management goals, and to determine appropriate treatment for harvest units in the Project Area so that we can meet those goals.

Within the Northwest Baranof Project Area there are relatively healthy and vigorous second-growth stands, as well as old-growth stands with varying levels of forest health. Forest health within the Project Area is impacted at varying levels by rots and decays, mistletoe, cedar decline, and insects. In general, there is no distinct or obvious pattern of the "health" of the forest within the Project Area. One exception might be the incidence of cedar decline, which appears to be associated with soil water patterns across the landscape.

Forest stand structure is closely tied to position on the landscape and disturbance history of the stand. In general, most of the unharvested old-growth forest within the Project Area is uneven aged. These forests may be characterized as multi-layered, complex forests. Successional patterns and forest development tend to be intimately linked to frequent, small-scale disturbances such as wind. Within these old-growth forests, there are individual stands which may be characterized as even-aged forest. In even-aged stands there may be a wide range of diameter classes present, but typically most trees are very uniform in height.

Western hemlock and Sitka spruce dominate timber stands throughout much of the Project Area. Yellow cedar is an important associated species found in conjunction with hemlock and spruce. Other tree species within the Project Area include red alder, mountain hemlock, and shore pine.

Commercial Forest Land (CFL)

Depending on its vegetative cover, land in the Project Area has been categorized as forest land or nonforest land. Forest land is further categorized as commercial forest land (CFL) or noncommercial forest land (non-CFL).

Forest land is considered commercial if it produces or is capable of producing continuous crops of timber, and has not been withdrawn from the timber base by statute or administrative action. In order to be classed as CFL, the land must produce at least 20 cubic feet of wood fiber per acre per year, or contain at least 8 thousand board feet (mbf) of net timber volume per acre (Forest Service 1978). Old growth and second growth (including stands that have been naturally disturbed or logged) may qualify as CFL. About 40 percent of the land in the Northwest Baranof Project Area is CFL.

Non-CFL is forested land that is incapable of producing commercial quantities of timber or has been withdrawn from the timber base. Approximately 34 percent of the Northwest Baranof Project Area is forested non-CFL. The remaining 26 percent of the Project Area is classified as nonforest and includes estuarine tidal flats, shrub riparian areas, muskegs, meadows, alpine areas, rock outcrops, and freshwater lakes (Table 3 -10)

Table 3-10
Landbase by VCU (in acres)

VCU	Non-Forested	Forested Non-CFL	CFL	Total
287	10,516	16,592	15,281	42,389
288	1,243	3,637	2,245	7,125
289	1,358	3,888	3,307	8,553
290	737	2,776	1,746	5,259
291	584	3,907	7,517	12,008
292	5,479	6,891	11,695	24,065
299	15,891	4,601	3,175	23,667
300	2,272	4,201	6,283	12,756
301	1,513	885	3,302	5,700
302	794	6,259	7,154	14,207
Total	40,387	53,637	61,705	155,729

Source: Mork 1994

Volume Class

CFL in the Tongass National Forest has been stratified into volume classes for analysis purposes (Forest Service 1991). Each Volume Class aggregates existing timber stands with similar resource conditions and is represented by a range of merchantable timber volumes per acre. There is also CFL within the Project Area that is not included in this classification. This CFL includes areas of past harvest that have not yet produced 8 thousand board feet (mbf) per acre. Table 3-11 displays the volume ranges of merchantable timber for each of the strata. Table 3-12 shows the acres of CFL in Volume Classes 4 - 7 in the Northwest Baranof Project Area.

Table 3-11
Timber Volume Classes

Volume Class	Range of Volume (mbf/acre)
4	8-20
5	20-30
6	30-50
7	> 50

Table 3-12
Commercial Forest Land by Volume Class (by VCU and in Acres)

VCU	Total Forested CFL	Volume Class 4	Volume Class 5	Volume Class 6	Volume Class 7	Other
287	15,281	9,253	4,334	79	0	1,616
288	2,245	1,903	342	0	0	0
289	3,307	2,483	546	6	0	271
290	1,746	1,490	109	0	0	147
291	7,517	3,209	2,474	40	0	1,794
292	11,695	5,155	3,300	166	0	3,075
299	3,175	2,073	773	43	0	286
300	6,283	3,716	1,460	0	0	1,107
301	3,302	1,565	946	0	0	790
302	7,154	3,936	2,443	68	0	707
Total	61,705	34,783	16,727	402	0	9,793

Source: Mork 1994

Tentatively Suitable for Harvest

CFL is further classified as tentatively suitable or not tentatively suitable for timber harvest. In order to be considered tentatively suitable, forested land must:

- be at least 10 percent occupied by trees;
- be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions;
- have a reasonable assurance that the area can be restocked after final harvest; and
- not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service (Forest Service 1991).

For the purposes of this analysis, available tentatively suitable forested land must also have sufficient timber volume to be currently available for harvest (included in Volume Classes 4, 5, 6, or 7). Therefore, the total acreage of available tentatively suitable forest land displayed in Table 3-13 is less than the total CFL displayed in Table 3-12.

Table 3-13
Available Tentatively Suitable Forest Land (in acres)

VCU	Total Available Tentatively Suitable	Volume Class			
		4	5	6	7
287	11,488	8,007	3,441	40	0
288	2,050	1,733	317	0	0
289	2,214	1,923	285	6	0
290	1,156	1,088	68	0	0
291	5,138	3,014	2,091	33	0
292	7,107	4,251	2,693	163	0
299	1,976	1,391	542	43	0
300	4,794	3,495	1,299	0	0
301	2,144	1,446	698	0	0
302	5,584	3,729	1,800	55	0
Total	43,651	30,077	13,234	340	0

Source: Mork 1994.

Historic Timber Use

People have used trees in Southeast Alaska for ages. The Tlingit and Haida Indians used trees to construct canoes, build log-frame houses, carve totem poles, and to make household, personal, and ceremonial articles. Firewood was always in demand. The Indians cleared trees from some areas for villages or camps.

In the 1800's, the Russians began clearcutting at Sitka to build a foundry, a fort, dwellings, and boats. Growth of the Sitka colony increased the demand for lumber for new construction, firewood and charcoal. Shipbuilding was an important occupation, with yellow cedar favored for hull construction because of its durability. Selective logging for cedar took place along tidewater as far distant as Peril Strait, 60 miles away. In 1833 the Russians built a sawmill at Redoubt Bay south of Sitka. Sometime before 1853, a second sawmill was built at Sawmill Creek about 5 miles south of Sitka, and a third at Sitka. The Russian mills produced about 3 mbf of lumber daily. Lumber was sawn for local use as well as for export. By 1889, 11 sawmills were operating in Southeast Alaska, cutting timber for local use. Between 1910 to 1920 approximately 420 mmbf of sawtimber and piling was sold through 4,000 timber sales from National Forest lands (Harris and Farr 1974).

Prior to 1959, timber harvest activities in the Northwest Baranof Project Area were generally insignificant. Logging occurred in small clearcut units or as selective harvests along streams at the head of the bays, or along salt water using A-Frame logging systems. Two exceptions were clearcuts of approximately 639 acres at the head of Fish Bay and 219 acres along the stream just east of Goose Cove. Both of these units were logged in the early 1950s.

In 1956 the Alaska Lumber and Pulp Company was awarded a 50-year timber sale contract. The company opened a pulp mill at Silver Bay near Sitka in 1959. Between 1959 and 1970 approximately 12,286 acres of old-growth forest was clearcut in the Project Area under terms of the APC Long-term Timber Sale Contract (Table 3-14). Commercially harvested species include western and mountain hemlock, Sitka spruce, and yellow cedar.

Table 3-14
Recorded Timber Harvest (in acres)

VCU	Before 1961	1961-1970	1971-1995	Total
287	842	827	0	1,669
288	0	0	0	0
289	279	0	0	279
290	149	0	0	149
291	16	1,919	0	1,935
292	992	2,893	0	3,975
299	1,574	138	0	1,712
300	6	1,085	0	1,091
301	3	784	0	787
302	0	689	0	689
Total	3,861	8,335	0	12,286

Reforestation

Reforestation is the process of establishing new trees on harvested units. A silviculturist must certify that harvest units meet or surpass stocking guidelines within a five year period following harvest (USDA Forest Service 1991c). Reforestation can be accomplished by natural seeding from surrounding timber stands or by planting. Natural regeneration usually produces satisfactory results in Southeast Alaska. However, there are situations where hand planting may be necessary or desirable. Examples include when a natural source of seed for a desired species is inadequate to maintain a timber stand's current species composition, or when it is desirable to reduce the time needed for natural regeneration. All of the previously harvested areas have been certified as adequately stocked except 44 acres in VCU 291, and 346 acres in VCU 299.

Precommercial Thinning

Natural renegeration often results in overstocked stands and necessitates a precommercial thinning in order to facilitate growth. Thinning is the systematic regulation of growing stock in a young forest. Precommercial thinning involves the selective removal of trees from second-growth stands that are typically 15 to 25 years old. Thinning reduces competition among trees in the stand, which stimulates growth of the remaining trees. Precommercial thinning may also control species composition, improve windfirmness, or increase forage. Approximately 3,611 acres have been thinned in the Project Area (Table 3-15).

Table 3-15
Acres of Past Precommercial Thinning

VCU	Acres
287	49
288	0
289	0
290	0
291	335
292	1,631
299	632
300	563
301	401
302	0
Total	3,611

Hunting, Fishing, and Subsistence

Hunting

Mountain goat, brown bear, and Sitka, black-tailed deer are species taken both by subsistence and sport hunters. To get an understanding of the magnitude of hunting it is important to look at not just the number of animals harvested but also look at the number of hunters, number of days hunted, percent of successful hunters and average hunter days.

The Project Area lies within four WAAs delineated by the State of Alaska to analyze harvest, population, and habitat data for wildlife planning and management (Figure 3-1). The WAAs lie within Game Management Unit 4 which is a much larger area that includes all of Baranof, Chichagof, Kruzof, and Admiralty Islands. The state uses Game Management Units for regulatory purposes.

Sitka Black-tailed Deer

Residents of Sitka (1,439 hunters) hunted 8,307 hunter days and 81 percent were successful. On average Sitkans hunted 5.8 days and harvested 2.2 deer per hunter. Within the Project Area WAAs, 895 hunters reported hunting 2,168 (Table 3-16). Over 60 percent of the hunters reported being successful (harvesting at least one deer). Deer season extends from August 1 to December 31 on State lands, and to January 31 on Federal lands. Hunters are allowed to harvest 4 to 6 deer depending on where they hunt.

Table 3-16
Hunting Effort and Success for Sitka Black-tailed Deer in Project Area WAAs in Regulatory Years 1993-94

WAA	No. of Hunters	No. of Days Hunted	Average Hunter Days	Average Trips per Hunter	No. of Successful Hunters	Percent of Successful Hunters	Average Deer per Hunter
3001	563	1,365	2.4	1.8	338	60.1	0.9
3312	83	124	1.5	1.0	48	58.5	0.8
3313	93	310	3.3	1.3	72	76.9	1.3
3314	156	369	2.4	1.3	94	60.4	0.9
Total	895	2,168	2.4		552	61.6	

Source: Hartmann 1995.

Mountain Goat

The mountain goat season extends from August 1 to December 31. One goat may be taken. Goat hunters are required to have a State registration permit. In ADF&G game management unit 4 (GMU-4) six permit holders were non residents, and all six permit holders hunted. In Project Area WAAs, 118 hunters reported hunting 226 days for mountain goats (Table 3-17). Thirty one percent of the hunters were successful. The successful hunters averaged 2.0 hunter days.

Table 3-17
Hunting Effort and Success for Mountain Goat in Project Area WAAs for the 1993-94 Regulatory Year

WAA	No. of Successful Hunters	No. of Days Hunted by Successful Hunters	No. of Unsuccessful Hunters	No. of Days Hunted by Unsuccessful Hunters
3001	10	9	12	25
3312	0	0	0	0
3313	2	2	4	4
3314	3	7	3	13
Total	15	18	19	42

Brown Bear

In the Project Area, there are two brown bear seasons per year, a spring hunt and a fall hunt. The spring hunt extends from March 15 to May 20. The fall hunt extends from September 15 through December 31. Brown bear hunting is also a permit-only hunt with restrictive bag limits, and hunters are required to purchase a metal locking tag. One bear may be harvested every four regulatory years. Subsistence hunters must follow these rules and must salvage the edible meat of a brown bear. Since the meat is generally not used by Southeast Alaska hunters, bear harvest is considered sport harvest. There is no State of Alaska subsistence season for brown bear in Southeast Alaska, except under Federal regulations for residents of Yakutat.

For the 2 bear seasons in regulatory year 1993-94, 670 brown bear permits were issued from ADF&G for GMU-4. Two hundred and eighty seven permit holders hunted a total of 1,562 days or on average 5.4 days per hunter a field. In GMU-4 156 permit holders were non residents and 152 had the services of a guide. In Project Area WAAs 38 hunters reported hunting 98 days for brown bear (Table 3-18). Sixteen percent of the hunters were successful. The successful hunters averaged 6.8 hunter days. The unsuccessful hunters averaged 1.8 hunter days.

Table 3-18
Hunting Effort and Success for Brown Bear in Project Area WAAs for the 1993-94 Regulatory Year

WAA	No. of Successful Hunters	No. of Days Hunted by Successful Hunters	No. of Unsuccessful Hunters	No. of Days Hunted by Unsuccessful Hunters
3001	2	6	9	21
3312	0	0	0	0
3313	2	22	8	16
3314	0	0	6	11
Total	4	28	23	48

Fishing

Sport fishing opportunities are found throughout the Project Area. Most important are Nakwasina River, and Fish Creek which have sizable coho salmon and steelhead trout populations. A cluster of lakes between St. John Baptist Bay and Fish Bay have cutthroat trout and Dolly Varden char. Nakwasina Passage has a lake with cutthroat trout and a second with Dolly Varden char that are easily reached from Sitka. A lake near Range Creek has unconfirmed reports of cutthroat trout. ADF&G Sport Fish Division is studying fish populations in the lakes between St. John Baptist Bay and Fish Bay. Numbers elsewhere are unknown.

According to the most recent Southeast Alaska Sport Fishing Economic Study (Jones & Stokes Associates, Inc., 1991), sport fishers in the Sitka harvest area spent an estimated $10.7 million in 1988. Associated revenues included local sales tax, lodging tax, state fishing licenses, and corporate income taxes. Beyond the numbers, the bays and streams within the planning area are important to the quality of life of Sitkans.

Subsistence

Subsistence use of natural resources on the Tongass National Forest is a way of life through which many rural residents of Southeast Alaska maintain their physical, economic, cultural, and social existence. Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) requires the Federal Government to provide a subsistence priority to rural Alaskan residents on federal public lands. ANILCA defines subsistence as:

"...the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." (ANILCA, 16 USC 3113).

ANILCA provides for "the continuation of the opportunity for subsistence uses by

rural residents of Alaska, including both Natives and non-Natives, on public lands." It also legislates that "customary and traditional" subsistence uses of the renewable resources shall be the priority consumptive uses of all such resources on the public lands of Alaska."

In July 1990, the Federal Government took over management of subsistence use of wildlife resources on federal lands regulated through the Federal Subsistence Board. A priority for the taking of fish and wildlife from public lands for subsistence purposes is given to Alaska residents of rural areas or communities if a resource shortage occurs.

Subsistence activities include hunting, fishing, and trapping, as well as collecting berries, edible plants, and fuel wood. In addition to the harvest and consumption of resources, subsistence is also an important component of social life. Sharing with family and friends is embedded in local culture. Forty-one percent of all deer-harvesting households in Southeast Alaska give deer meat to friends and relatives (Kruse and Muth 1990). In addition, resources may be traded among communities unable to obtain specific subsistence resources locally. Thus, distribution of wild, renewable resources represents an essential part of the tradition and culture of Southeast Alaska (Langdon and Worl 1981).

Subsistence Use Areas

People gather subsistence resources in the beach fringe throughout the Project Area. The Tongass Land Management Plan (TLMP) defines coast or beach fringe as the area of land within a 500-foot horizontal distance inland from the shoreline.

Estuaries in Katlian (just south of the Project Area), Nakwasina, and Fish Bay provide important habitat for waterfowl, and hunting opportunities for ducks, geese, and brown bears. The tidal flats in these bays provide important shellfish habitat. The bays also have salmon runs which contribute to the abundance of other wildlife that use the estuaries.

Popular deer hunting areas include Nakwasina drainages, St. John Baptist Bay, Neva Strait, Fish Bay, Peril Straits, Sergius Narrows and Deadman Reach. Popular goat hunting areas include Katlian, Nakwasina, and Rodman Bay drainages. Marten are commercially trapped in the Rodman Bay, Fish Bay, St. John Baptist Bay, and Nakwasina drainages.

Historical Use

Goldschmidt and Haas (1946) identified land-use patterns associated with Native communities that existed in the mid-twentieth century in Southeast Alaska. It appears that hunting and fishing use by Natives in Southeast Alaska is still tied to some extent to traditional land use. Despite technological advances (such as large, modern boats) that would allow residents of Native communities to travel greater distances to hunt or fish, their use appears to be concentrated in areas of traditional clan boundaries. The distribution of harvest locations for non-Native communities, on the other hand, often ranges over greater areas.

Historical clan hunting boundaries of the Angoon and Sitka Tlingit overlap with the

Project Area (see Appendix I). Only the communities of Angoon and Sitka have traditional use areas within the Project Area. Portions of the Northwest Baranof Project Area fall within the traditional use areas of the Kaukwedi clan from Angoon and the Kiksadi, Kagwantan, Luqnaxadi, Tcukanedi, Luqanadi, and Dak'dentan clans from Sitka.

Current Use

Subsistence is a complex issue covering many aspects of lifestyles which are embodied in the people who reside in Alaska. We used ADF&G harvest data to determine which communities should be included in the subsistence analysis. Sitka residents are the most dependent on the Project Area for deer harvest. Sitkan's derived 38 percent of their total harvest from the Project Area during the years 1987 through 1992. The communities listed in Table 3-19 reported harvesting deer from Project Area WAAs during 1987-1992. Residents of Cube Cove Camp, Hollis, Hydaburg, Long Island Camp, Meyers Chuck, and Yakutat also reported hunting in Project Area WAAs, but did not report any harvest. Sitka is the closest community to the Project Area, and Angoon is the next closest community. Residents of Sitka can reach the Project Area by skiff. Fifteen other communities each obtain less than one percent of their total deer subsistence harvest in the Project Area. The pattern is similar for other subsistence resource use in the Project Area, with Sitka being the dominant user community.

Table 3-19
Communities That Reported Deer Harvest from Project Area WAAs from 1987-1992

Community	Mean No. of Deer Harveste d	Percent of Community's Deer Harvest	Percent of Total Harvest from Project Area WAAs	Mean No. of Deer Harvested from WAA			
				3001	3312	3313	3314
Angoon	7	3	<1	2		5	
Haines	12	4	1	1	9		
Hidden Falls	<1	10	0				
Hoonah	1	<1	0			1	
Juneau	27	<1	2	6	2	4	7
Kake	1	1	<1	1			1
Ketchikan	16	1	1			6	2
Other AK	26	12	2	10		5	2
Outside AK	8	13	1	3		1	
Pelican	1	1	0				
Petersburg	16	1	1		1	15	
Port Alexander	2	3	<1		2		
Port Protection	0	0	0				
Sitka	**1,270**	**38**	**90**	**502**	**141**	**139**	**129**
Skagway	1	5	0				
Tenakee Springs	0	0	0				
Thoms Place	2	100	<1			1	
Thorne Bay	3	1	<1				
Wrangell	16	4	1	3	1	4	3

Subsistence/Personal Use Fishing

In recent years, the Sitka office of the Commercial Fisheries Division has issued up to 669 subsistence/personal use fishing permits. The vast majority of the permittees seek sockeye salmon from lakes that occur outside the Project Area, primarily Redoubt Lake, and Necker Bay. Some take pink and chum salmon from Katlian Bay and Nakwasina by personal use permit holders. In 1988, for instance, there were 265 total subsistence/personal use permit holders for the Sitka area. Six permittees harvested 32 pink salmon and 131 chum salmon from Katlian Bay. In Nakwasina, six permit holders harvested 2 sockeye salmon, 50 pink salmon, and 52 chum salmon. There appears to be adequate supply of pink and chum salmon at Katlian and Nakwasina to meet the current demand.

Sitka's Subsistence Use

Sitka residents harvest deer, bears, goats, seals, waterfowl and other birds, furbearers (marten, mink, and river otter), salmon, shellfish, marine fish, and berries. The annual harvest of subsistence resources was 139 pounds per capita in 1987. Subsistence resources provided about 24 percent of the household food. Deer and salmon were the largest resource items harvested, comprising 27 percent and 28 percent, respectively, of the total per capita harvest. Other finfish (25 percent) were also an important subsistence item harvested.

Sitka residents harvested more than 90 percent of the deer taken from the Project Area between 1987 and 1992. Based on data from 1987 to 1992, Sitka obtains approximately 38 percent of its deer harvest in the area. The mean annual harvest from the Project Area is 1,096 deer. Of these, a mean of 936 were taken by Sitka residents.

Angoon's Subsistence Use

Angoon residents harvest deer, bears, goats, seals, waterfowl and other birds, furbearers (marten, mink, and river otter), salmon, shellfish, marine fish, and berries. The annual harvest of subsistence resources was 242 pounds per capita in 1987, with subsistence resources providing about 46 percent of the household food. Angoon residents harvested less than 1 percent of the deer taken from the Project Area between 1987 and, which comprises 3 percent of the reported deer harvested by Angoon residents.

Recreation and Scenic Quality

Recreation

While the large acreage of Northwest Baranof is impressive, difficult and steep terrain, wetlands, and dense vegetation confine most recreational activities to accessible shorelines, rivers, streams, and lakes. Roads exist in isolated locations where timber harvest has taken place in the past. However, these roads are not connected to each other or to any town. The Forest Service does not maintain these isolated roads and in many places alder growth on the road surface has restricted travel, leaving little more than wildlife trails.

Recreation Use

Access to the Project Area is primarily by boat from salt water. Float planes are available on a charter basis and can land on several lakes within the Project Area. The Alaska Marine Highway provides ferry service to the community of Sitka (population 8,588). All ferries traveling to Sitka pass through Peril and Neva Straits adjacent to the Project Area. In 1994, State ferries traveled to Sitka 287 times, resulting in 574 passes through the waters adjacent to the Project Area. There was a total of 74,218 passengers on board for those 574 passes.

The Project Area boundary extends from one to approximately 30 air miles from the northern end of the Sitka road system. Nautical distance from the Old Sitka boat launch (near the northern end of the Sitka road system) to the farthest water access point in the Project Area (Rodman Bay) is approximately 45 miles.

Popular recreation activities in the general area include picnicking, camping, hiking, photography, beach activities, and boating by either kayak, canoe, or motorboat. There are many fine anchorages for small boats scattered throughout the Project Area. Recreationists also enjoy viewing and hunting wildlife, including big game, small game, and waterfowl. The majority of the recreation which takes place in the Project Area is marine based and occurs on the lands immediately adjacent to the salt water. Fishing takes place in saltwater, streams, and lakes. Some outfitter and guide permits allow guides to charter throughout the Tongass National Forest. Available charters include bear hunting, fishing, and wildlife viewing trips.

Several commercial enterprises specializing in wildlife viewing and fishing trips use the saltwater around the Project Area but do not have Forest Service Outfitter and Guide Permits. These operators do not need permits because they do not go to shore. One Sitka-based charter operator took over 22,000 visitors to the Salisbury Sound, Neva Strait, Nakwasina Passage, and Nakwasina Sound portions of the Project Area in 1993.

Recreation facilities within the Project Area include a Forest Service recreation cabin on Piper Island in Schulze Cove and Forest Service emergency shelters located at Channel Rocks in Kakul Narrows and on Otstoia Island. A corrugated steel cabin on southern Lauf Island (built by a State of Alaska crew), and three abandoned Forest Service tent platforms at the old LTF near the head of Fish Bay also exist. Although the steel cabin and tent platforms are not maintained as Forest Service recreation facilities, they are

often used by people recreating in the area and are maintained irregularly by the users. In addition, old road systems lie along portions of several creeks, each terminating at a log transfer facility (LTF) on the saltwater. No other shelters, cabins, or recreation facilities are known to exist in the Project Area. Recreation facilities just outside the Project Area boundaries include recreation cabins at Allen Point (in Nakwasina Sound) and Appleton Cove, and an emergency shelter on the west side of Neva Strait.

We can use existing recreation activity to project demand for recreation opportunities in the future. Demand for a variety of recreation settings is growing. The greatest increase in demand is for natural appearing areas accessible by small boats which are located away from primary marine travel ways. Throughout the Tongass National Forest it appears that this demand will not be met in the future because demand will exceed supply by the end of the decade. We project that demand for all other recreation settings will be met.

Recreation Setting

A major component of recreation and tourism is the setting in which activities take place. Setting effects the opportunities, activities, and experiences which can occur and the overall satisfaction of a person's visit. Much of the tourism industry in Southeast Alaska relies heavily on the visual setting.

Although the Forest Service inventories a wide range of recreation settings in its Recreation Opportunity Spectrum (ROS) inventory system, for practical purposes we can divide the Northwest Baranof Project Area into two basic settings: natural and modified. The areas we are calling "natural" are those where human modifications are not the dominant part of the landscape. Most of the shorelines and inland areas which are not located near old harvest units or roads fall into this category. The areas we are calling "modified" have human modifications to the environment as a dominant part of the landscape. The area around all roads and most harvest units fall into this setting.

Table 3-20
Acres of Natural and Modified Recreation Setting by VCU

VCU	Natural Setting (Acres)	Modified Setting (Acres)
287	38,708	3,684
288	7,126	0
289	8,560	0
290	5,262	0
291	8,290	3,720
292	15,805	8,266
299	20,400	3,270
300	10,049	2,708
301	3,743	1,960
302	11,981	2,235
Total	129,924	25,843

Source: Flynn 1995. This information was derived from the ROS inventory in the Chatham Area GIS.

Presently, 83% of the Project Area is in a natural setting and 17% is in a modified setting.

Because most of the recreation which takes place in the Project Area is marine based and occurs immediately adjacent to the salt water, the shoreline setting is important.

Table 3-21
Miles of Shoreline Setting by VCU

VCU	Natural Setting	Modified Setting
287	23.2	0.7
288	10.7	0.0
289	12.2	0.0
290	5.0	0.0
291	3.2	1.2
292	0.0	14.9
299	0.0	6.7
300	6.7	2.9
301	0.0	4.2
302	19.9	2.5
Total	80.9	33.1

Source: Flynn 1995. This information was derived from the ROS inventory in the Chatham Area GIS database.

Presently, 71% of the Project Area shroelines are in a natural setting and 29% are in a modified setting.

Recreation Places

Within the Northwest Baranof Project Area there are 24 inventoried Recreation Places totaling 24,621 acres (displayed in Figure 3-2 and listed in Table 3-22). A Recreation Place is an identified geographic area having one or more physical characteristics attractive to people engaging in recreational activities. These features may be beaches, streamside areas, road or trail corridors, or areas surrounding lakes, cabins, or anchorages. Each Recreation Place has one or more activities associated with it such as viewing scenery or wildlife, boating, hiking, fishing, dispersed camping, and hunting.

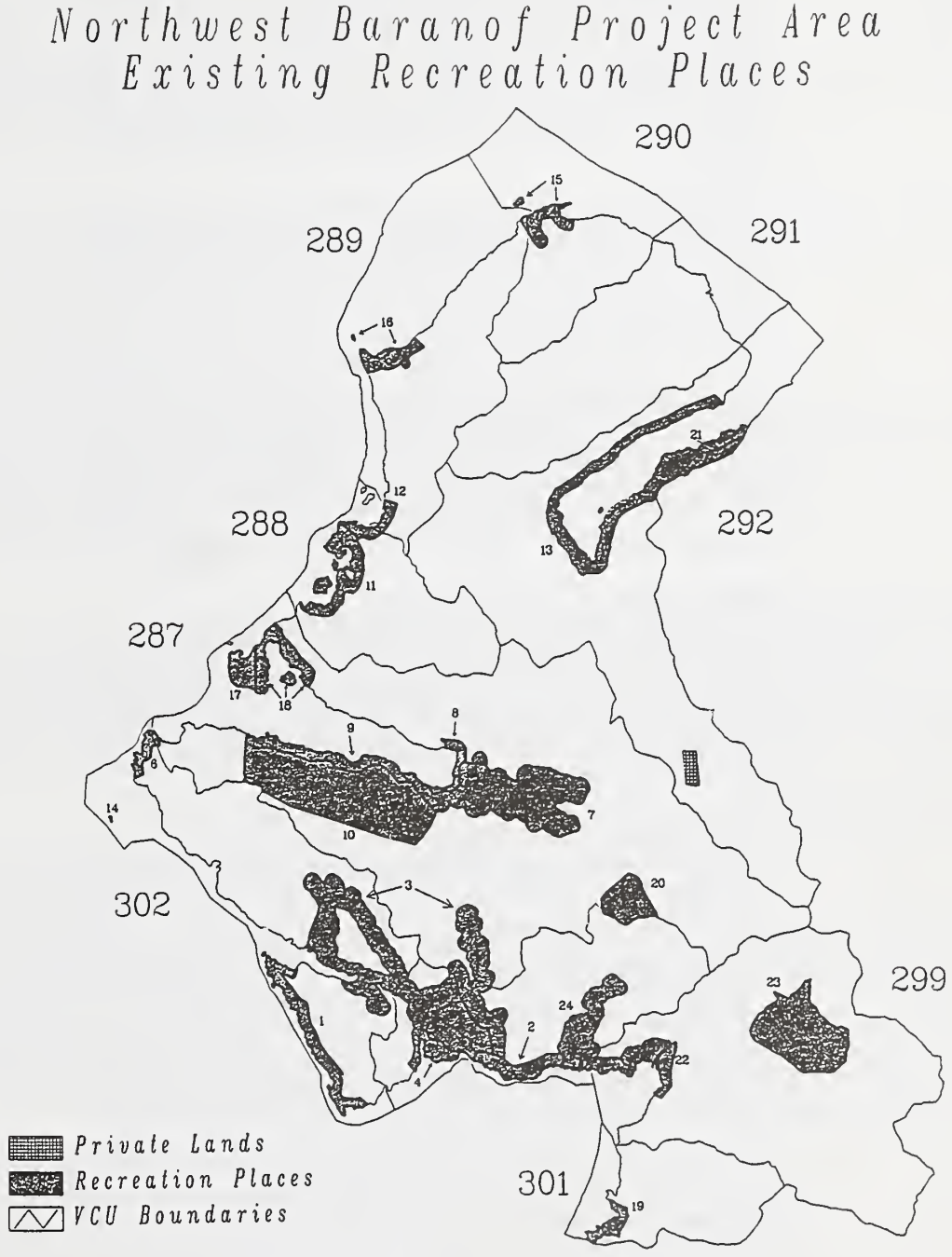
Table 3-22
Recreation Places and Their Features

Map Number	Recreation Place	Features	Setting**	Acres
1.	Neva Strait*	Anchorage, High boat use*	N	843*
2.	Nakwasina Passage*	Big game and Waterfowl hunting*	N	501*
3.	St. John Baptist Bay Road System	ORV use, Hiking, Lake/stream fishing	M	4,720
4.	Nak.Passage/St. Johns Road	Shoreline, Big game hunting	N	346
5.	St. John Roads Uplands	Big game hunting	N	503
6.	Channel Rocks	Emergency shelter, Anchorage	N	200
7.	Fish Bay Road System	Dispersed camping, Hot Springs, ORV use	M	2,828
8.	Head of Fish Bay	Anchorage, Trail, Hiking, Estuary	N	211
9.	Haley Anchorage/Haley Point	Anchorage, Big game hunting	N	662
10.	Haley Point Uplands	Big game hunting	N	3,841
11.	Bear/Baby Bear Bay	Anchorage, Camping, Nature study	N	798
12.	Range Creek Cove/Yellow Point	Camping, Hiking, Boat access	N	270
13.	Rodman Bay	Anchorage, Cabin, Shoreline	M	2,215
14.	Sinitsin Cove*	Beach, picnicking*	N	2*
15.	Nismeni Cove	Hunting, Shelter, Cove	N	396
16.	Pogibshi/Goose Cove	Shoreline, Grass flats	N	375
17.	Launch Cove/Island Point	Anchorage, Hunting, Sergius Narrows	N	331
18.	Schulze Cove/Piper Island	Anchorage, Cabin	N	610
19.	Nakwasina Sound, East*	Dispersed camping, Shoreline, Hunting	M	250*
20.	Hemorrhoid Lake	Dispersed camping, Big game hunting	N	675
21.	Appleton Cove*	Big game hunting*	M	145*
22.	Head of Nakwasina Sound	Waterfowl hunting, Dispersed camping	M	569
23.	Rosenberg Lake	Dispersed camping, Big game hunting	N	2,076
24.	Nakwasina Passage Road System	Big game hunting, Hiking	M	1,254

TOTAL 24,621

Source: Flynn, 1995 Note: This information derived from Chatham Area Geographic Information Systems (GIS).
*Recreation Place extends beyond the Project Area. Features and acres listed are only for that portion within the Project Area.
** N - natural, M - modified

Figure 3-2
Recreation Places



Road Management

Some recreation opportunities within the Northwest Baranof Project Area are influenced by the existence and use of roads. The mere existence of a road changes the recreation setting. Roads are used as travel corridors for easier access to interior lands and for recreation activities specific to roads (e.g., recreational driving). The condition of these roads and the management objectives for public or other use of these roads are major factors influencing the recreation settings, activities, and experiences of visitors to the Project Area. We use Road Management Objectives (RMOs) in planning the design, maintenance, and access strategies of each road. We develop RMOs with their effect on recreation opportunities in mind. Additional information on RMOs in Appendix D.

The Forest Service has not maintained roads throughout the Project Area. We have discouraged or eliminated motor vehicle access by allowing the roads to become overgrown with alder or by removing drainage structures. In most cases, RMOs which specifically prohibit motor vehicles refer to vehicles over 1,000 lbs. gross vehicle weight (GVW). The road systems in the Project Area are isolated. Access for vehicles over 1,000 lbs. GVW requires the use of large landing craft type vessels to deliver the vehicles to the saltwater termini of the roads. Since a very small proportion of the roads in the Project Area are passable by these larger vehicles, people have seldom, if ever, gone to the expense of bringing them in to use. Off-road vehicles (ORVs) are the primary type of motor vehicle used in the Project Area. ORVs can be brought to shore using a skiff. ORV operators are keeping the roads in the St. John Baptist Bay and Katlian Bay road systems maintained and clear of brush to the extent necessary to operate their ORVs.

Roadless Areas

Large sections of the Northwest Baranof Project Area have been inventoried as roadless. This inventory was used at the Forest Plan level for evaluating an area's capability and availability for management as Wilderness or allocation to other roadless management prescriptions. This type of prescription recommendation is beyond the scope of project level planning, therefore the roadless inventory is not further addressed in this document.

Recreation Special Use Permits

The Forest Service has issued special use permits to twenty-five outfitters and guides which allow them to operate in the Project Area. One additional permit is pending. The guides using the Northwest Baranof Project Area advertise wildland guided hunting, fishing, camping, sight-seeing, photography, wildlife viewing, and cultural ecotourism. Most of the guides access the area by boat. The Project Area lies in portions of State of Alaska Big Game Outfitter/Guide Use Areas 04-03, 04-04, and 04-13. Eight of the 26 Outfitters and Guides with existing or pending Forest Service special use permits are registered with the State of Alaska for outfitting and guiding big game hunts in the Project Area (Alaska Division of Occupational Licensing, 1993).

In March 1994 the Chatham Area Forest Supervisor announced a moratorium on the authorization of any additional outfitter-guide special use permits for guided brown bear hunting on National Forest lands and waters within Game Management Unit 4 (GMU-4). This moratorium is to be in effect for the full 1994 and 1995 hunting seasons.

The moratorium allows permits to be issued only to those outfitters and guides who possessed valid Forest Service permits for GMU-4 in the 1993 season. The number of brown bear hunting contracts allows for each Outfitter/Guide are based on the number of contracts the Outfitter/Guide held in the 1992 and 1993 hunting seasons. All of the Northwest Baranof Project Area lies within GMU-4. The Forest Service imposed this moratorium in response to the significant increase in applications to the State for Outfitter Guide Permits for guiding brown bear hunting in GMU-4. The moratorium is intended to provide reasonable protection for the brown bear resource and maintain the state quo while the State develops a long-term management system adequate to protect the wildlife resource, visitor experience, and guiding industry. It will also protect reasonable opportunities for the public to secure guided hunts within GMU-4 until the State solution is in place.

The moratorium on outfitter guide permits for brown bear hunting has caused the numbers of these permits the Forest Service has issued to be artificially low. Demand for brown bear outfitter guide permits is much higher than the total number issued indicates.

Wild and Scenic Rivers

The Chatham Area found no rivers within the Project Area eligible for inclusion in the National Wild and Scenic Rivers System (Supplement to the Draft TLMP Revision EIS, Appendix E). Determination of eligibility and suitability of rivers for the Wild and Scenic River System is not within the scope of project level planning.

Special Areas

In 1991 the "Sitka Ranger District Recreation Scoping Document" identified the area in the Fish Creek drainage around the hot springs and its access trail as a high priority for recreational development. Plans included enhancement of the hot springs for recreational use if feasible, construction of an overnight shelter near the hot springs, and construction of a saltwater accessible recreation cabin in Fish Bay. To date, only the recreation cabin has been built. It is located on Piper Island near the mouth of Fish Bay.

The parcel of land extending south from Yellow Point which includes Baby Bear Bay, Bear Bay, and Bear Island has been selected by the State of Alaska for possible designation as a State Marine Park.

The Sitka District Coastal Management Program "Public Use Management Plan" (June 1993) prepared by the City and Borough of Sitka identifies the Fish Bay Hot Springs and Trail, the Big Bear/Baby Bear Bays State Marine Park, and the Nakwasina Passage to the head of Nakwasina Sound as "Special Management Areas." These "Special Management Areas" have been identified by the City and Borough as having significance due to high recreational use of the areas by the residents of Sitka. As part of the Coastal Management Program these areas are to be managed with special priority given to recreational use.

Scenic Quality

The tools we use to evaluate visual resources are Existing Visual Condition, Visual Quality Objective, Visual Sensitivity Level, and Variety Class. These tools are briefly described here, and are more fully defined in the Glossary.

Existing Visual Condition

The Existing Visual Condition is an assessment of the current level of visual quality. Existing Visual Condition may range from Type I, where little or no human modification is apparent, to Type VI, where human-made changes in the landscape are in glaring contrast to the natural landscape. The acreage in each Existing Visual Condition class for Project Area VCUs is displayed in Table 3-23.

Table 3-23
Acres in each Existing Visual Condition by VCU

VCU	EVC I	EVC II	EVC III	EVC IV	EVC V	EVC VI	Total Acres
287	37,107	0	0	3,297	1,988	0	42,392
288	7,126	0	0	0	0	0	7,126
289	7,950	0	607	3	0	0	8,560
290	4,000	0	1,241	21	0	0	5,262
291	3,139	26	0	3	6	65	12,010
292	7,763	0	304	6,362	199	0	24,307
299	16,804	71	0	1	27	1	23,669
300	6,650	640	2,200	0	3,267	0	12,757
301	1,110	0	0	4,185	408	0	5,703
302	9,335	0	0	0	4,882	0	14,217
Total	100,984	737	4,352	13,872	10,777	66	156,003

Visual Quality Objectives

Visual Quality Objectives (VQOs) are visual resource management goals for National Forest System lands. VQOs provide a baseline for measuring changes for use in managing National Forest Lands. The VQOs are based upon the variety in the landscape, the distance between the landscape and the viewers, and how much the landscape is viewed. Project Area VQOs and acreages are shown by VCU in Table 3-24.

Table 3-24
Visual Quality Objectives by VCU

VCU	Retention		Partial Retention		Modification		Maximum Modification		Total
	Acres	%	Acres	%	Acres	%	Acres	%	Acres
287	777	2	15,676	37	15,072	36	10,867	25	42,392
288	319	5	4,360	61	880	12	1,567	22	7,126
289	218	3	7,915	92	0	0	427	5	8,560
290	0	0	3,944	75	1,236	23	82	2	5,262
291	0	0	6,487	54	2,397	20	3,126	26	12,010
292	0	0	3,203	13	18,867	78	2,237	9	24,307
299	595	2	4,184	18	17,718	75	1,172	5	23,669
300	200	2	5,767	45	2,412	19	4,378	34	12,757
301	143	3	2,264	40	2,600	45	696	12	5,703
302	968	7	7,239	51	3,095	22	2,915	20	14,217
Total	3,220	2	61,039	39	64,277	41	27,467	18	156,003

Visual Sensitivity

Areas which are viewed from the Peril Strait, Salisbury Sound, and Sitka Sound travel routes of the Alaska Marine Highway System and the heavily traveled small boat routes are areas of high visual sensitivity. Portions of all Project Area VCUs except VCU 292 (Rodman Bay) are visible from marine travel routes and are given the highest visual sensitivity designation, Level 1.

Variety Class

We consider Variety Classes when developing VQOs and in making management decisions. Variety Class A (1% of the Project Area) refers to "distinctive landscapes" where features of land form, vegetation patterns, water forms, and rock formations are of unusual and outstanding visual quality. Variety Class B (52.5% of the Project Area) refers to "common landscapes" where features contain variety in form, line, color, and texture, or combinations thereof, but which tend to be common throughout the character type. Variety Class C (46.5% of the Project Area) refers to "minimal landscapes" where there are few changes in form, line, color, and texture. Variety Class C landscapes are naturally monotonous and often improved by modification.

3 Affected Environment

Current Condition

The Northwest Baranof Project Area encompasses ten Value Comparison Units (VCUs) which are each distinct visual environments. Descriptions of the existing visual condition of each VCU follow.

VCU 287 includes Fish Bay, Louise Cove, and Schulze Cove. The majority of this VCU is Variety Class C, characterized by rolling terrain and occasional blocky outcrops. Dense spruce and hemlock forest add little textural and color diversity. The shoreline is simple, with few coves, inlets and streams, and therefore lacks interest.

Entering Fish Bay, the simpler landscape provides a dramatic frame for Annahootz Mountain and the Fish Bay drainage system. Much of the main Fish Bay drainage is Variety Class B. It is a more diverse landscape with alder and spruce/hemlock forested tidal flats fed by numerous cascading streams and rivers. The tidal flats contrast with the powerful vertical slopes of the surrounding valley walls and snow-capped mountains.

Fish Bay is a high use area for commercial and sport fishing (Sensitivity Level 1), while the Fish Bay tidal flats are a hunting and fishing area (Level 2). Schulze Cove is used as a boat anchorage (Level 1). The eastern extent of the tidal flat contains a hot spring and a small plane route (Level 2).

VCU 288 contains the southern portion of Peril Strait, as well as, Bear Bay, Baby Bear Bay and Adams Channel. The majority of the VCU is made up of a Variety Class C; this is particularly reflected in the seen areas, with a rolling topography and typical spruce/hemlock vegetation. The shoreline is close to travel routes along this stretch of Peril Strait which results in a greater amount of foreground. The remainder is middle ground. The shoreline provides a stronger contrast with tidal flats, secondary coves, inlets and islands lining the edge. These elements, in combination with a rocky, wave cut shore and vegetative diversity, create a Variety Class B setting in the foreground. Secondary angular peaks, with vegetative, line, color, and textural diversity are seen beyond the surrounding Variety Class C middleground.

The majority of this VCU is visible from the Alaska Marine Highway Route and from Level 1 small boat and Level 2 plane routes. Baby Bear Bay, a State Marine Park Selection, contains a Level 1 anchorage surrounded by a Variety Class C landscape. The intimacy of this area and the domination of isolated B-rated peaks in the middleground creates a cumulative impact greater than the inventoried Variety Class. All of VCU 288 can be seen from the adjacent anchorage in Deep Bay (VCU 280).

VCU 289 contains the northern portion of Peril Strait and Deadman Reach. Traveling north through this VCU, the nearby shore and the dominance of foreground gives way to the open waters of Peril Strait. Most of the shore foreground is made up of a weak edge, while the middleground lacks vegetative and geologic diversity resulting in a Variety Class C rating. The southern portion of the shore shares the same tidal vegetation species and geologic variety as in VCU 288, and is especially prominent during low tides. The northern extent of this VCU is viewed in the middleground and becomes more heavily sloped, characterized by defined crests, blocky profiles, and

secondary peaks. These slopes, Variety Class B, contain a variety of color, texture and line, and act as a backdrop for the entire VCU.

Povorotini Island is within the foreground of this VCU and contains definite edge contrast and spatial definition (Variety Class B) when compared to the surrounding landscape. Regeneration of previous harvest areas on the steeper slopes along Deadman Reach have an EVC Type III rating. This VCU has the Alaska Marine Highway Route and a small boat route running through its entirety and a great majority of the site is visible from this Level 1 sensitivity travel route. Deadman Reach is used as a commercial fishing area (Level 2).

VCU 290 includes the north central area of Duffield Peninsula, Nismeni Cove and Otstoia Island. Similar to the northern extent of VCU 289, this VCU contains steep slopes, and dominating peaks and crests in the background. The typical dense spruce/hemlock vegetation creates minimal variety in the landscape and therefore a Variety Class C middleground. This landscape makes up much of the VCU (43%), while the background of diverse secondary peaks and crests is Variety Class B. The shoreline is rocky but lacks any further unique characteristics. Otstoia Island has similar but more interesting geology with small beaches and rocky shores. Two old harvest areas are visible from water travel routes. The regrowth has become sufficient to "mask" much of the cut. However, the color contrast is obvious.

Nismeni Cove is used as a Level 1 anchorage. Much of the VCU can be seen from the Alaska Marine Highway Route in Peril Strait, as well as small plane and boat routes. A portion of Deadman Reach is within this VCU and is used by commercial fishermen.

VCU 291 includes northeast Duffield Peninsula and Peril Strait in the area of Peschani Point. The majority of this VCU is in middleground and background, with a large portion unseen due to the topography. The water edge is made of gently sloping terrain with minor coves, spruce/hemlock vegetation and lacks diversity. An unseen valley floor with moderately complex valley walls runs through much of the VCU. This topographical diversity, with its cascading streams and slight variation in the vegetation lends the valley walls to a Variety Class B, while the valley floor rates a C.

The southeast portion of VCU 291, which is highly visible from the Alaska Marine Highway Route, has recently been harvested and shows sufficient regeneration to rate the area as a Type IV EVC. The VCU is seen primarily as middleground from the Level 1 small boat, Level 2 small plane and Alaska Marine Highway routes.

VCU 292 includes Rodman Bay and the Rodman Creek drainage basin. The entrance of Rodman Bay has moderately complex terrain, with well-defined secondary crests. However, the northern side of the Bay has been heavily harvested and these activities have created a distinct pattern and texture; contrasting with the old growth character. The north slope also has little topographic variety, and the bay edge has little diversity, although the rocky coast and vegetative edge provide some interest. These characteristics result in the north slope having a Variety Class C, while the south slope contrasts with a rolling terrain and stronger shore edge to rate a Variety Class B.

At the head of the bay, the tidal flats lend diversity to both terrain and vegetation. Blocky terrain with strong angular peaks forms the backdrop. The spruce/hemlock

forest gives way to naturally occurring openings with cascading water, creating great diversity and a B Variety Class. Much of the valley has been harvested, in both seen and unseen areas, and lends it toward an EVC rating of Type V. This is also true for the harvested bay edges which are highly visible. The majority of this VCU is unseen beyond the aforementioned seen areas of Rodman Bay. The entrance is viewed as middleground with the tidal flats and drainage basin as background.

VCU 299 consists of the drainage area for the northeast portion of Nakwasina Sound. The majority of this VCU is unseen, while steep dramatic slopes make up the seen areas. A large tidal flat in the foreground is surrounded by steep slopes cut by cascading streams. Although visually dramatic, much of the diversity is masked by a thick covering of spruce and hemlock. Cascading streams and occasional rocky outcrops create a Variety Class B setting, while the higher altitudes have rocky peaks, vegetative diversity and small snow fields. Craggy, snow-capped peaks rise in the background.

Nakwasina Sound is used as a Level 1 small boat and Level 2 small plane route. The area is also a Level 1 hunting and fishing use area.

VCU 300 includes Nakwasina Passage and most of Halleck Island. Halleck Island has been excluded from the Project Area so only that portion of the VCU on Baranof Island is being considered. North of Nakwasina Passage the terrain is greatly varied, as ridges modified by streams rise above a large tidal flat. The seen portion of this area is foreground and middleground. However, much of this VCU is unseen. This entire area is blanketed by the typical spruce/hemlock vegetation, which masks any geological diversity. This lack of diversity results in much of the landscape rated Variety Class C.

The tidal flat in the foreground does offer vegetative and textural diversity, and rates a B. The largest peak in this area also has vegetative variety, as well as angular peaks and blocky outcrops, and this middleground feature is classified as a Variety Class B.

Nakwasina Passage is used as a Level 1 small boat route and hunting and fishing area.

VCU 301 contains the southern portion of Nakwasina Sound. A vast majority of this small VCU is unseen. Seen areas are viewed in the foreground and middleground. The foreground includes a tidal flat and steep, sloped ridge. The landscape is a somewhat monotonous blanket of spruce/hemlock (Variety Class C). Much of the lower portion of this ridge has been harvested. The ridge line contains secondary peaks and vegetative diversity and is typical for Variety Class B. Behind this ridge rise two higher ridges with stronger peaks, vegetative diversity and geological features which extend further down the slope. These areas are viewed as middleground and qualify as Class B.

Nakwasina Sound is used as a Level 1 small boat and Level 2 small plane route, while the area is also a Level 1 hunting and fishing use area.

VCU 302 is the area between Salisbury Sound and Nakwasina Passage and runs parallel to Neva Strait, Olga Strait and contains St. John Baptist Bay. The portion of this VCU on Partofshikof Island has been excluded from the Project Area. The narrow

width of this VCU, with Olga and Neva Strait flowing through it, results in a majority of this VCU being seen in the foreground and middleground.

Much of this area lacks vegetative, geologic, and terrestrial variety. The smooth rolling hills lack outcrops, and are forested by a spruce/hemlock community with many snags. The majority of the VCU is variety Class C, with Variety Class B representing the balance.

The shore, which is close to Level 1 sensitivity travel routes, has limited interest from a distance, but a more interesting landscape can be seen when traveling along the shoreline. The shoreline along Salisbury Sound becomes rocky and craggy and this narrow foreground strip receives a B Variety Class.

Shoreline areas of the VCU are hunting and fishing use areas(Level 1). Olga and Neva Straits are Level 1 sensitivity routes used by the Alaska Marine Highway and small boats. Whitestone Cove is used as a Level 1 boat anchorage. St. John Baptist Bay is used by small boats (Level 2).

Heritage Resources

Heritage Resources are limited and nonrenewable and are found throughout the entire National Forest System. It is our responsibility to manage these limited assets through a program of inventory and protection so that they can be enjoyed by future generations.

We are evaluating heritage resources within the Northwest Baranof Project Area in accordance with the National Historic Preservation Act (NHPA) of 1966 as amended, the National Environmental Policy Act (NEPA) of 1969 and a series of implementing regulations and policies.

In this analysis we consider two types of heritage resources: Traditional properties and historic sites. Traditional properties are areas or events of cultural importance. Historic sites are places or locations where material remains of past human life or activities are present. A historic site, sometimes called a cultural resource, is a tangible, locatable resource.

Our archeologists have identified numerous traditional properties and historic sites within the Project Area. The identification of all types of heritage resources has been and continues to be facilitated by open and candid consultation with representatives of the Sitka Tribe of Alaska.

Cultural History

Southeast Alaska is part of the Northwest Coast culture area which extends from the Gulf of Alaska to northern California (Suttles 1990).

There are more than 2,000 known historic and prehistoric sites in Southeast Alaska. Archeological excavations have provided evidence of the presence of humans here for the last 9,500 years. In Southeast Alaska, archeological sites dating to before 1741 are representative of the Prehistoric Period and those dating to after 1741 belong of the Historic Period. As the prehistory of Southeast Alaska spans more than 9,000 years, archeologists have subdivided it into an Early Period (9,500 - 5,000 years ago), a Middle Period (5,000 - 1,500 years ago) and a Late Period (1,500 years ago to 1741) (Moss 1990). Microblade tools are commonly associated with sites of the Early Period, while shell middens and ground stone tools are associated with sites of the Middle and Late Periods.

Southeast Alaska is the home of the Tlingit, Alaskan Haida (Kaigani), the Tsetsaut and Eyak. Of the four, the Tlingit have been dominant, controlling at one time or another the entire southeastern panhandle from north of Yakutat Bay to Dixon Entrance (Arndt et al. 1987).

The Tlingit are a "nationality" based upon common language and customs (de Laguna 1990). Subdialect differences define three Tlingit groups, each containing several tribes. The subdialect areas are: the Gulf Coast (Yakutat and Dry Bay tribes), Northern Tlingit (Chilkat, Hoonah, Hutsnuwoo, Auk, Taku, Sumdum, and Sitka tribes), and Southern Tlingit (Kake, Kuiu, Henya, Klawock, Stikine, Sanya, and Tongass tribes). Each tribe occupied a specific region and use of this region was divided according to clan rights (de Laguna 1990).

The bulk of the Northwest Baranof Project Area falls into the territory traditionally claimed by the Sitka Tlingit. A small portion of the Project Area falls into the territory traditionally claimed by the Angoon Tlingit.

> Sitka Territory extends the full length of the Pacific Coast of Chichagof and Baranof Islands from Point Urey in the north to Cape Omaney. It includes, of course, all the myriad islands lying off the coast. It extends inward up Peril Strait between Chichagof and Baranof Islands into Hoonah Sound as far as Patterson Bay... (Goldschmidt and Haas 1946).

There is no definitive boundary between the Sitka and Angoon territories within Peril Strait. "Peril Strait as far [west] as Poison Cove was Angoon Territory" (Goldschmidt and Haas 1946).

> Sitka Territory touches that of Angoon in Peril Strait. The detailed information available on Sitka occupation of Poison Cove, Ushk Bay, Fick Cove and Patterson Bay supports the Sitka contention that this area is properly assigned to their community. Statements made by Angoon witnesses are not in disagreement (Goldschmidt and Haas 1946).

The historic period in Southeast Alaska began with European exploration. The Russian Kamchatka Expedition of 1741 was the first to reach the coast, however European presence was slight until 1774. From 1774 to 1795, ships from Russia, Spain, England, France, and the United States visited Southeast Alaska and their arrival initiated dramatic changes in regional subsistence and land use patterns. Disease and conflict reduced the Native population, Russian settlements and forts were built, and trade of sea otter for European goods became important (Arndt et al 1987, Bower 1995).
The sale of Alaska to the United States in 1867 ushered in more change. During the nineteenth century a variety of commercial and government ventures were undertaken in Southeast Alaska, including fox farms, mines, World War II military installations, homesteads, timber harvest, commercial fishing, and Civilian Conservation Corps projects (Arndt et al 1987, Bower 1995).

Previous Cultural Resource Surveys

Our initial literature search revealed that prior to 1992 nine cultural resource inventories had been conducted by the Forest Service, Bureau of Indian Affairs, or Sealaska Corporation within the Project Area. These surveys consisted largely of small project-specific inventories involving limited acreage. Previous timber sales in the Project Area date to the 1950's and 1960's, prior to any heritage resource management activities on the Chatham Area (Table 3-25).

Table 3-25
Previous Archeological Investigations Conducted in the Project Area

Location	Year	Project	Investigator	Sites
VCU 287				
Fish Bay	1985	Native Allotment A033472 Annie Davis*	Navarre	49SIT300
Fish Bay	1991	Fish Bay Rec Cabin	Irish	none
Fish Bay	1991	Fish Bay Trail Reconstruction	Irish	none
VCU 299				
Nakwasina Sound	1975	Sealaska Surveys+	Herem	none
Katlian Bay	1985	Native Allotment J-010940 heirs of Mary Gray	Navarre	none
VCU 300				
Nakwasina Passage	1975	Sealaska Surveys	Herem	none
VCU 302				
St. John Baptist Bay	1985	Native Allotment A-060988	Navarre	none
Kakul Narrows	1991	Kakul Narrows Shelter	Lively	none
Otstoia Island	1991	Otstoia Island Shelter	Lively	none

*Native Allotment surveys conducted by the Bureau of Indian Affairs. +Sealaska Corporation surveys conducted by Wilsey and Ham, Inc.

Nine reported and unconfirmed site locations were identified during the preliminary literature search. The list included sites listed on the Alaska Heritage Resource Survey which had not been confirmed, sites listed as "unconfirmed sites" in "Native Cemetery and Historic Sites of Southeast Alaska" (Herem 1975), and possible site locations identified during the ethnographic research explained below.

Heritage Resource Investigations 1992-1995

Heritage resource investigations include both ethnographic research and archeological survey. Ethnographic research helps us to identify possible historic site locations and traditional properties. Systematic archeological survey, based on a sound survey design, is an effective means of identifying historic sites; that is "any place or location where material remains of past human life or activities are present" (Hutt 1992).

Ethnography is the study of cultures through observation.

Ethnographic Investigations

Archeologists and volunteer cultural anthropologist Dr. Dorthea Theodoratus contacted the Sitka Tribe of Alaska and individuals within the Native community in order to gather Tlingit knowledge of the Project Area. Dr. Theodoratus shared the preliminary results of her work with us and she is currently finalizing her notes. Her preliminary findings were used to, in part, guide field inventory efforts.
Fred Hope, a Sitka Tlingit, worked with Forest Service archeologists as an archeological technician. He helped research the significance of some of the historic sites in the Project Area and was instrumental in identifying Tlingit names for a number of the sites.

Ethnographic research continues to help us identify historic sites and the less tangible, but important traditional properties in the Project Area. One such property is the Sitka Kiks.adi Survival March Route. Following the Battle of 1804 with the Russians, the Sitka Kiks.adi left Sitka and traveled overland to Hanus Bay in Peril Strait (Hope March 3, 1993). Such a "Survival March" (as it has come to be known) would have necessitated travel across the north end of Baranof Island. No physical or material remains associated with the event have been identified within the Project Area. While various members of the Native community have differing views about the specific route the Kiks.adi may have taken, there is general agreement that the marchers would have had to cross the Project Area to reach Hanus Bay. The march was an important event in the history of the Sitka Tlingit.

Additional heritage resources may be identified as consultation with Sitka Tribe of Alaska continues.

Probability and Archeological Survey

The 1992 and 1993 archeological surveys focused on specific acreage lying within the "high Probability zone" for cultural resources. "High" probability simply means that, based on previous archeological surveys, it is likely an historic site may lie within a predefined geographic or physical setting. The "high probability zone" for Northwest Baranof is sea level to the 100 foot contour. Drainages and lakes which have historically contained anadromous fish species are also included, as well as mineralized zones containing historic mining activities, areas of traditional ethnohistoric subsistence use and legend sites (Autrey 1992).

During 1992 and 1993 archeologists systematically surveyed 93% of the acreage and 100% of all areas of proposed project activity (cutting units, roads, and log transfer facilities) lying in the high probability zone. They also investigated unconfirmed sites and inspected known ones. In total the four person field crew surveyed 11,520 shoreline acres, 41.25 miles of proposed roads, 404 acres in 11 cutting units, and seven proposed log transfer facility locations. They also monitor surveyed 55.75 miles of existing roads and six existing log transfer facility sites.

Historic Sites

Archeologists documented 46 sites during the 1992 and 1993 field seasons. Thirty-two of the sites are prehistoric, seven are historic, and three are both prehistoric and historic. The dates for four are either unknown or modern.

Table 3-26 lists Alaska Heritage Resource Survey (AHRS) numbers for each site, it's associated site type and the results of radiocarbon analysis. The table also shows whether the site is prehistoric or historic and indicates whether or not it is eligible for inclusion on the National Register.

Table 3-26
Summary of Historic Sites Documented in the Project Area

AHRS # 49SIT-	Site Type	Radiocarbon Age	Period	NRHP Eligible?
VCU 287				
300	habitation	1510 ± 60	Middle Prehistoric	Yes
	garden	-	Historic	
335	midden	-	Undated	Yes
359	rock align.	-	Prehistoric	No
360	Cabin	-	unknown	No
382	habitation	1240 ± 80	Historic	Yes
383	garden	-	Late Prehistoric	Yes
384	military	-	Historic	Yes
385	cabin	-	Historic - WWII Historic	No
VCU 288				
353	midden	1430 ± 90	Late Prehistoric	Yes
354	midden	890 ± 90	Late Prehistoric	Yes
355	midden	-	Undated	Yes
357	rock align.	-	Prehistoric	No
358	Midden	1120 ± 60	unknown Late Prehistoric	Yes
VCU 289				
432	habitation	1100 ± 80	Late Prehistoric	Yes
VCU 290				
433	habitation	760 ± 70	Late Prehistoric	Yes
		1340 ± 70	Late Prehistoric	Yes
VCU 291				
356	midden	1250 ± 70	Late Prehistoric	Yes
VCU 299				
404	cabin	-	Historic - WWII	Yes

Table 3-26
Summary of Historic Sites Documented in the Project Area

AHRS # 49SIT-	Site Type	Radiocarbon Age	Period	NRHP Eligible?
VCU 300				
397	habitation	1870 ± 70	Middle Prehistoric	Yes
	cabin	-	Historic	
398	fish weir	modern	modern	??
399	midden	670 ± 70	Late Prehistoric	Yes
400	rock align.	-	unknown	No
401	structures	-	Historic - WWII	Yes
402	midden	870 ± 70	Late Prehistoric	Yes
403	midden	390 ± 70	Late Prehistoric	Yes
407	habitation	1070 ± 90	Late Prehistoric	Yes
408	midden	1360 ± 70	Late Prehistoric	Yes
409	midden	1260 ± 90	Late Prehistoric	Yes
VCU 301				
410	habitation	1220 ± 90	Late Prehistoric	Yes
411	midden	830 ± 90	Late Prehistoric	Yes
412	midden	510 ± 70	Late Prehistoric	Yes
413	midden	1100 ± 80	Late Prehistoric	Yes
414	habitation	710 ± 90	Late Prehistoric	Yes
415	habitation	760 ± 80	Late Prehistoric	Yes
VCU 302				
386	habitation	1940 ± 90	Middle Prehistoric	Yes
387	midden	1150 ± 70	Late Prehistoric	Yes
388	midden	1080 ± 80	Late Prehistoric	Yes
389	midden	1080 ± 70	Late Prehistoric	Yes
390	midden	800 ± 80	Late Prehistoric	Yes
391	midden	1970 ± 60	Middle Prehistoric	Yes
392	military	-	Historic - WWII	Yes
393	habitation	740 ± 90	Late Prehistoric	Yes
		920 ± 80	Late Prehistoric	
394	habitation	1820 ± 90	Middle Prehistoric	Yes
395	habitation	1630 ± 80	Middle Prehistoric	Yes
396	habitation	970 ± 80	Late Prehistoric	Yes
405	midden	1450 ± 90	Late Prehistoric	Yes
406	habitation	1410 ± 70	Late Prehistoric	Yes
	recreation		Historic - WWII	

3 Affected Environment

Lands

The Project Area contains the following alienated lands, encumbrances, use restrictions, and partial interests.

State, Municipal, and Private Lands

State, municipal, and private lands are not owned by the United States. The following State, municipal, and private lands are located within the Project Area:

- MS (Mineral Survey) 554 (181.767 acres), located in VCU 292 along Rodman Creek; and
- MS 555 (55.407 acres), located on the shore of Rodman Bay in VCU 292.

State Selections

Section 6(a) of the Alaska Statehood Act of 1958, authorized the State of Alaska to select 400,000 acres of vacant and unappropriated land from within the National Forests of Alaska, for furthering the development and expansion of Alaskan communities. The following lands within the Project Area have been selected by the State of Alaska under Statehood Act authority but they have not yet been conveyed by the Bureau of Land Management (BLM):

- AA-71690 at Lisianski Peninsula, located in VCUs 301, 310, and 313;
- AA-71691 at Nakwasina Sound, located in VCUs 301 and 313; and
- AA-71693 at Baby Bear, located in VCU 288.

Native Allotment Applications

Native allotments are authorized by the Alaska Native Allotment Act of 1906 which provided an opportunity for Native individuals who had occupied lands prior to their designation as a National Forest, to apply to the BLM for conveyance of up to 160 acres, under conditions prescribed by the Act and federal regulations (43 CFR 2561). Section 18(a) of ANCSA repealed the Alaska Native Allotment Act with a savings clause which provides that allotment applications submitted prior to enactment of ANCSA (December 18, 1971) would still be processed. The following unconveyed Native allotment applications are located within the Project Area:

- A-033472 (Annie Davis, deceased), 4 acres located at Fish Bay in VCU 287;
- A-060985 (Johnny John, deceased), located at Nakwasina Sound in VCUs 301 and 313;
- J-010940 (heirs of Mary Gray, deceased), located at Nakwasina Sound in VCU 299; J-011250 (Eddie Marshall, deceased), located at Nakwasina Sound in VCUs 301 and 313;
- J-011911/A-060988 (Peter John), located at St. John Baptist Bay in VCU 302.

Withdrawals

Withdrawals close lands to further entry under the federal land laws, federal mining laws, or both. These withdrawn lands are set aside for specific purposes stated in the instrument that created the withdrawal. Incompatible uses are precluded, in accordance with the withdrawal language.

The following withdrawals are located within the Project Area:

- Lighthouse Reserve at Otstoia Island, located in VCU 290;
- Lighthouse Reserve at Kakul Narrows, located in VCU 302; and
- Lighthouse Reserve at Povorotni Island, located in VCU 289.

Administrative Classifications

Like withdrawals, administrative classifications appropriate land for a particular purpose which is stated in the document establishing the classification. Unlike withdrawals, classifications are established within the Department of Agriculture. They can be rescinded at the same level of authority that established them. Incompatible uses will be precluded, in accordance with language in the classification.

There is one administrative classification located within the Project Area. It is a Public Service Site (Schulze Cove Dock Site), located in VCU 287.

Rights-of-Way Acquired

These are rights-of-way acquired for administrative use by the Government or for public use. They include rights-of-way reserved from conveyance and those acquired after conveyance. Depending upon language within the applicable documents and type of grant, they may allow for construction, maintenance, use, reconstruction, or relocation of roads, trails, or other facilities.

There is one acquired right-of-way located within the Project Area. It is Alaska State Tideland Permit SET-93-028 (issued 4/20/93, expires 4/19/98) which authorizes construction of a barge facility and access dock at Appleton Cove in VCU 293, within Sec. 10, T. 51 S., R. 63 E., CRM. Also see corresponding Department of the Army Corps Engineers permit Appleton Cove 4, as modified.

Non-Recreation Special Use Authorizations

"Special use authorization" is a generic term that includes specific types of authorizations, such as a special use permit, temporary permit, term permit, easement, or lease. A special use permit does not grant an interest in National Forest System lands; however, a lease or an easement generally does.

There is one non-recreation special use authorization located within the Project Area. It is a special use permit for a shelter (tent platform), located on an unnamed lake approximately 1.5 miles north of Nakwasina Passage in VCU 300, within the SW4, Sec. 18, T. 53 S., R. 63 E., CRM.

Transportation Systems and Facilities

Roads

There are 51.3 miles of existing road in the Northwest Baranof Project Area. Of these, 40.8 miles are collector roads and the remaining 10.5 miles are classified as local roads (Table 3-27). The Project Area contains no state highways, ferry terminals, or airports.

Roads in the Project Area were built in the 1960's for timber harvest and many are now overgrown with alder. Culverts and bridges were removed to allow for proper cross drainage and to reduce washing out of the roadways.

Table 3-27
Miles of Existing Road

VCU	Collector Miles	Local Miles	Total Miles
287	6.6	3.0	9.6
291	6.6	0.0	6.6
292	13.1	1.3	14.4
299	0.0	0.4	0.4
300	4.6	3.8	8.4
301	3.9	0.0	3.9
302	6.0	2.0	8.0
Total	40.8	10.5	51.3

Logging Camps

There are no logging camps in the Northwest Baranof Project Area at this time. During past timber harvest there were logging camps located in Rodman Bay, Fish Bay, St. John Baptist Bay, and Nakwasina Sound. All logging camps were removed after harvest was completed. All that remains of any of the logging camps is a flat spot on the landscape that has been overgrown with alder and other vegetation. Where float camps were used, no trace of the camp was left on site.

Marine Transportation

There is only one marine transportation route connecting Sitka to the rest of Southeast Alaska. The route borders the Project Area on the north and west, and is used by tour boat operators, barge lines, and the Alaska Marine Highway.

The Alaska Marine Highway is also a popular mode of transportation for visitors to Southeast Alaska. Travelers can relax in the comfort of the ferry and enjoy the surrounding landscape and seascape. The ferry schedule varies from summer to

winter, with less frequent service in the winter. The winter schedule averages 23 ferry visits (or 46 passes through the Project Area) per month.

Aircraft Access

Float planes provide the primary means of air access to the Project Area. Mountain goat hunters are typically flown in to Cold Storage Lake (one of the inland lakes in the Project Area) for hunting trips.

Power Transmission

The Supplement to the Draft Tongass Land Management Plan Revision identifies a power transmission corridor that extends from Sitka through the Project Area to Nakwasina Sound then turns northeast and passes Mt. Rosenburg and Annahootz Mountain, and leaves the Project Area at the headwaters of Rodman Creek.

Log Transfer Facilities

In 1976 Schultz and Berg reported the following bark coverage, in acres, for six of the LTF sites in the Project Area.

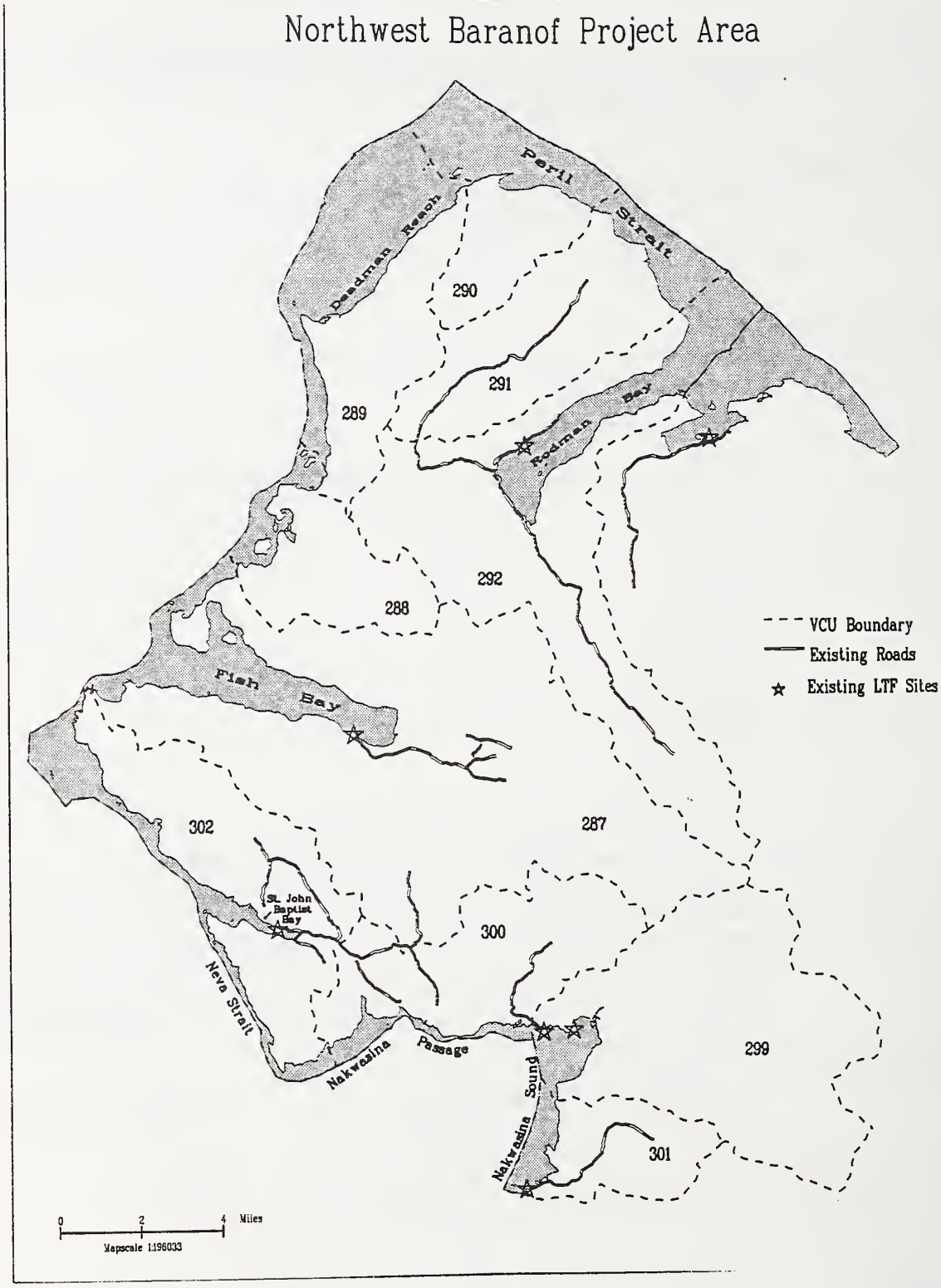
Table 3-28
Bark Coverage at Previously Used Log Transfer Facility (LTF) Sites

LTF Location	Bark Coverage in Acres
Fish Bay	1.6
Katlian Bay	0.8
Nakwasina 8	3.8
Nakwasina 9	0.0
Rodman Bay	2.8
St. John Baptist Bay	1.5

The eight LTF sites which currently exist in the Northwest Baranof Project Area (Figure 3-3) have not been active since the late 1960's. All of the LTFs were constructed as bulkhead/A-Frame type log transfer facilities. These LTF sites have been allowed to grow over with natural vegetation and some of the fill has washed out. The LTFs are in different states of deterioration. They are located in Rodman Bay, Fish Bay, St. John Baptist Bay, and three in Nakwasina Sound. These sites were in existence prior to the establishment of the current LTF siting guidelines. Figure 3-3 shows the previously used LTF sites.

Of the existing sites, Fish Bay LTF does not meet the criteria to site LTFs away from the mouths of anadromous fish streams.

Figure 3-3
Previously Used LTF Sites



Off-Site Human Environment

Economics

Regional Perspective

The importance of the Tongass National Forest to the regional economy cannot be over emphasized. Most communities in Southeast Alaska are characterized by a dependence on one or more natural resource-based industries including wood products, commercial fishing and fish processing, tourism and commercial recreation, mining, and mineral development. Government (especially in Juneau), transportation services, and educational services are also significant income sources. Residents of the numerous small, rural communities also depend heavily on subsistence fishing and hunting to meet their basic needs. The following section provides an overview of the regional economy and the economy of Sitka.

Regional Economics

The Northwest Baranof Project's primary area of social and economic influence is Southeast Alaska. This geographic region extends roughly 500 miles from Ketchikan in the southeast, to Yakutat in the northwest. The region is mainly unpopulated wild country. The Tongass National Forest constitutes nearly 80 percent of Southeast Alaska and is the largest forest in the National Forest System. Southeast Alaska's population of 69,000 is divided among 33 cities, towns, and villages which are surrounded by, or located very near the boundaries of the Tongass.

Human settlements in Southeast Alaska range in size from one person private home sites to a 28,000 person full-service community (Juneau). Most settlements are accessed exclusively by aircraft, boat, or the Alaska Marine Highway system. Haines and Skagway are the only communities which have direct highway access to Canada and the rest of the United States. Some communities are connected to forest road systems which may allow them access to Private, State, or National Forest lands or to other small communities. However these systems are not connected to Canadian or U. S. highways and the communities are thus very isolated. This relative degree of remoteness, combined with the considerable scenic and recreation opportunities provided by the Tongass National Forest, is sought by many who desire a more self-reliant lifestyle. Residents are often quick to point out that the quality of life found in Southeast Alaska outweighs the possible disadvantages of seasonal employment, lack of jobs, costs of importing goods and services, transportation difficulties, and bad weather.

Most residents of communities in Southeast Alaska depend directly on the environment for their livelihood through commercial fishing and fish processing, timber harvesting and processing, mining, tourism, commercial recreation, and/or subsistence use (Table

3-29). Because there is only a limited amount of private land in the region, continued access to the abundant natural resources of the Tongass is of utmost importance to many residents.

Table 3-29
Southeast Alaska Wage and Salary Employment 1994 and 1996 Forecast

	Annual Average Employment 1994	Annual Average Employment 1996	
Goods Producing	5,850	5,550	-300
Mining	150	225	+75
Construction	1,550	1,525	-25
Manufacturing	4,150	3,800	-350
Seafood Processing	1,650	1,525	-125
Forest Products	2,200	1,950	-250
Service Producing	29,350	30,000	+650
Transportation	2,900	2,975	+75
Trade	6,550	6,750	+200
Wholesale	550	550	0
Retail	6,000	6,200	+200
Finance, Insurance, Real Estate	1,450	1,600	+150
Services and Misc.	6,200	6,575	+375
Government	12,300	12,100	-200
Federal	2,000	1,950	-50
State	5,350	5,250	-100
Local	4,950	4,900	-50
Total	35,200	35,550	+350

A mixed bag of employment growth and decline is projected for Southeast Alaska in the near term. Gains are expected in the mining industry following the reopening of the Greens Creek mine on Admiralty Island. Construction employment is expected to increase in response to a number of residential and public works projects. As the number of visitors to Southeast Alaska continues to increase, employment in the services and retail trade sectors of the economy will also increase. The gains in these industries are expected to be tempered, however, by the effects of the Wrangell mill shutdown, if it continues, as well as the Sitka pulp mill closure. The outlook for government employment is also bleak as budget concerns are expected to lead to job cuts. Finally, a new individual fishing quota system instituted for some fish species is expected to reduce the number of seasonal and short-term processing and fishing crew positions.

Community Economics

The largest community near the Project Area is Sitka (population 8,588) which is located approximately 5 miles south of the southern end of the project boundary. Sitka is located on the west side of Baranof Island and is the only community in Southeast Alaska which fronts the open sea. Sitka was originally settled by the Tlingit people. Alaskan Natives represent about 21 percent of the population today. The rich coastal resources of the area, especially the sea otter, attracted traders of many nationalities, including Russian, American, and English. By 1799, Sitka Sound was a favored trading spot on the northwest coast. Sitka was the capital of Russian America until 1867 when Alaska was purchased by the United States.

Sitka became the seat of the territorial government in 1884 and remained the hub of activity until the capital moved to Juneau in 1896. In the years following the capital move Sitka's economy depended almost entirely on fishing and fish processing. After nearly fifty years, the commercial fishing and cannery boom ended for most of Southeast leaving a severely depleted salmon resource. In recent years, the canneries have been replaced by cold storage facilities in Sitka and commercial fishing once again is of significant economic importance to the community.

Bear hunting guides and commercial tour operators from communities in Southeast and other communities outside the region use the Project Area during the hunting and summer tour seasons. Sitka is an important port of call for cruise ships touring the Inside Passage. Approximately 200,000 cruise ship passengers visited the community in 1994. There has been an increase of more than 100% in visitation rates since 1989. The independent visitor segment of the tourism market has also grown rapidly in recent years. In the summer of 1989, a total of 27,940 independent travelers came to Sitka, accounting for 22 percent of total visitation. By 1993, the number of independent travelers had increased to 42,500, or 53 percent of total visitation. Sitka Residents visit the Northwest Baranof Project Area for recreational and subsistence hunting and fishing and for other recreational purposes. The Project Area is considered by many Sitka Residents to be their "Back Yard."

The modern growth of the wood products industry in Sitka began in the 1950's when the Alaska Lumber and Pulp Company (now Alaska Pulp Corporation (APC)) was awarded a fifty-year timber sale contract with the Forest Service. The company subsequently built and operated a dissolving pulp mill just outside of town, adding 450 high-paying jobs to the local economy. After only 30 years of operation, APC closed the Sitka pulp mill in the fall of 1993. As a result, Sitka's basic economy is once more in a transition period, with an increasing dependence on the seafood, tourism, health care, and education industries--most of which have grown or remained stable since 1992. Timber sales from within the Project Area would be available for offering under the Ketchikan Pulp Company (KPC) long-term contract or as part of the independent timber sale program. A number of communities in the region have logging firms that could be employed in timber harvest activity in the Project Area. Several communities have wood processing facilities that would likely use timber provided from the Project Area. These include Wrangell, Ketchikan, Metlakatla, and Klawock. Table 3-30 shows the relative strength of different sectors of the Sitka economy today.

Table 3-30
Total Employment and Payroll - Sitka 1994

	Employment	Total Payroll (in millions)	Average Annual Wage
Health Care	610	$22.6	$37,049
Education	483	$15.0	$31,056
Seafood Industry	667	$16.5	$24,738
Seafood Harvesting	400	$10.0	
Seafood Processing	231	$5.5	
Aquaculture	36	$1.0	
Construction	234	$7.0	$29,915
Tourism	285	$7.3	$25,614
Forest Products	26	$1.1	$42,308
Government	647	$20.1	$31,066
Wholesale and Retail Trade	653	$8.3	$12,710
Transportation, Communication, Utilities	108	$6.1	$56,481
Services	418	$3.1	$ 7,416
Other Manufacturing	79	$3.4	$43,038
Finance, Insurance and Real Estate	77	$1.9	$24,675
Miscellaneous	22	$ .2	$ 9,090
Total	4,409	$112.5	$25,516

Source: Sitka Economic Base Study, The McDowell Group, December 1994

Commercial Fishing and Fish Processing

Commercial fishermen harvested over 4 million salmon from waters around the Project Area in 1985 (ADF&G, 1993). Table 3-31 shows the combined catch for all gear for chinook, sockeye, coho, pink, and chum salmon in District 113 from 1982 through 1992. District 113 accounts for most of the harvest on salmon returning to streams in the Project Area and includes the following areas:

Sitka Sound
Nakwasina Pass
Nakwasina Sound
Katlian Bay
Outer Peril Strait
Hanus
Saook
Rodman
Hoonah Sound - Deadman Reach
St. John Baptist Bay
Ushk Bay
South Arm Hoonah Sound
North Arm Hoonah Sound
Sitkoh Bay
Outer Salisbury Sound
Inner Salisbury Sound
Lower Peril Strait
Deep Bay
Fish Bay

Table 3-31
Combined Catch (in numbers of fish) for Troll and Seine Captured Salmon in District 113

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1982	62	89	3,551	243,974	7,021	254,697
1983	103	5,170	2,873	1,125,658	28,258	1,162,062
1984	78	2,022	2,600	844,156	129,986	978,842
1985	747	4,029	8,528	3,860,742	146,298	4,020,344
1986	0	105	307	49,336	72,811	122,559
1987	56	3,751	3,180	235,414	86,418	328,819
1988	0	108	206	4,031	21,630	25,975
1989	5	6,535	2,077	1,012,680	26,747	1,048,044
1990	19	910	138	95,450	22,289	118,806
1991	68	1,522	1,223	358,970	23,144	384,927
1992	11	2,791	1,201	178,756	50,697	233,456

Timber Receipts and Payments

Annual payments are made to the State of Alaska from funds collected through the Tongass National Forest timber program and other National Forest receipts (e.g., special use permit and campground fees). Table 3-32 iitemizes these payments, and also indicates the annual receipts of the Tongass timber program. With few exceptions, 25 percent of all funds received by the program (including purchaser road credits) is paid to the State. The State in turn uses these funds to benefit public schools and public roads in the region. The total value of funds contributed in the past, however, has not comprised a significant portion of the total public school and public road budgets, for the cities and boroughs of Southeast Alaska (Thomas 1990).

Table 3-33 lists the payments the City and Borough of Sitka received from 1990 to 1994.

Table 3-32
National Forest Receipts and Payments to the State of Alaska, Fiscal Years 1980 - 1990

Fiscal Year	Tongass Receipts[1]	Payments to Alaska
1984	4,063,189	1,015,797
1985	209,231	52,308
1986	1,967,240	491,810
1987[2]	-2,033,575	---
1988	1,232,672	308,168
1989	20,183,133	5,045,783
1990	35,544,272	8,886,068
1991	36,968,718	9,242,180
1992	13,093,312	3,273,328
1993	15,607,652	3,901,913
1994	35,128,048	8,782,012
Total	161,963,892	39,439,452

Source:
USDA Forest Service, Tongass National Forest, R10-MB-149, August 1991. Tongass Land Management Plan Revision, Supplement to the Draft Environmental Impact Statement.

[1] Capital Investments such as permanent roads, bridges, log transfer facilities, and timber stand improvements also contribute to the total assets of the Tongass National Forest, reduce future management costs, and are scheduled to achieve management objectives described in the Tongass Land Management Plan.

[2] Tongass receipts for fiscal year 1987 were negative as a result of Comptroller General Decision B-224730 of March 31, 1987 to retroactively implement the emergency rate redeterminations for short-term sales. Without the reduction, Tongass receipts would have been positive by $2,139,943. As a result of the negative receipt, no payments to the State were made in 1987.

Table 3-33
National Forest Payments to the City and Borough of Sitka

Year	
1990	$975,555.00
1991	$1,002,372.00
1992	$355,222.00
1993	$403,243.00
1994	$948,804.00
Total	$3,685,197.00

Economic Efficiency of Timber Harvests

The National Forest Management Act of 1976 (NFMA) set forth explicit requirements for economic efficiency analysis of National Forest management proposals. While economic efficiency must be analyzed and considered, it is not the sole decision criterion. Although the Forest Service has generally tried to achieve cost-efficient management (lowest possible input cost per unit of output), systematic evaluation of all costs and benefits from practices and activities has been undertaken only in recent years.

The dominant non-priced commodities for the Northwest Baranof Project Area are embodied in the planning issues. The major components of Present Net Value (PNV) in the Project Area are timber, commercial fish, and recreation and tourism.

Social Values

There is considerable public debate about the values of the Tongass National Forest. This is part of a wider debate that is occurring at the national and global level. Increasing public concern about the relative importance of forest values - commodity, amenity and spiritual - have elevated this issue on the political agenda at the regional, national, and international levels. Changing values within society have led to changing expectations concerning the management of public lands.

The paradox is that the social values which we are least able to define and measure are the very ones that appear to be of increasing importance to our society. Resolving the conflict over social values cannot be done simply by creating a better way to give each social value a number ranking. Different people view different things as being more important because of fundamental differences in world view. Thus, different groups in society have different world views, values, and ethical stances. For this reason resolving these differences is best done in the political and social arena.

Many kinds of values are found in forests. Although we cannot measure and compare all of them, there is merit in identifying the many public benefits derived from the Northwest Baranof Project Area. Some of the social values provided by the forest setting include:

- Commodity values - timber, fish, minerals
- Amenity values - lifestyle, scenery, wildlife
- Environmental quality values - air and water quality
- Ecological services - habitat conservation, biodiversity
- Public use values - gathering, hunting, fishing, subsistence, recreation, tourism
- Spiritual values - sacred places, customary and traditional uses
- Health values - medicines
- Security values - sense of social continuity and heritage

These values, how and in what proportion they should be provided, and who they should be provided for, are at the center of the forest management debate in Southeast Alaska today. As these values play out in a world of change-- changing concepts of what the resources are and their importance, changes in who pays and who benefits, and changing institutions -- the conflict escalates, the decision-making space shrinks, and the risks to people and resources grow.

Lifestyles

Alaska has always been known as a wild and magnificent place, a vast expanse of unique scenery and seemingly limitless natural resources. Alaska is known as "The Last Frontier" (USDA Forest Service 1990). This reputation is clearly appreciated by many of the residents of Southeast Alaska; to many of these people, this region is viewed to be similar to the America of two hundred years ago. The quality of life in Southeast Alaska is also greatly enhanced by, and in many ways dependent on, the physical environment associated with the Tongass National Forest.

Southeast Alaska residents have a diverse set of lifestyles, values, and economic pursuits. Many people choose to live in Southeast Alaska because of the opportunity to

participate in the commercial fishing, timber, mining, and recreation industries. Other residents desire the lifestyles afforded by remote, uncrowded living situations and the opportunity to be close to their families and friendship networks. Still other people choose to remain in Southeast Alaska because of the hunting, fishing, recreation and subsistence opportunities, and the chance to live in close proximity to a wilderness environment. Many Native American residents remain attached to Southeast Alaska because it provides an important link in the practice of traditional customs, and in the preservation of their cultural heritage.

Many Southeast Alaska residents want to keep that which makes their part of the world unique. At the same time, they also want to maintain their economic livelihood (USDA Forest Service 1990). With a limited resource base, resolution of this conflict between quality of life and economic security has become increasingly difficult. The great diversity of attitudes, beliefs, values, and lifestyles suggests that the proposed Northwest Baranof Project would affect the population of Southeast Alaska in both positive and negative ways.

Proposals for logging in areas close to Sitka have raised local interest, sentiment, and debate about what mix of values the forest should provide. Although it appears that many in the community support a small timber industry to diversify the economy of Sitka, there is also considerable opposition to clearcut logging in areas considered to be in Sitka's "back yard." All of the Northwest Baranof Project Area appears to fall into that definition. At the heart of the debate is a sincere and strong desire on the part of most Sitka residents to maintain the type of lifestyle which they presently have.

Chapter 4
Environmental Consequences

Chapter 4
Environmental Consequences

In this chapter we describe the effects of the five alternatives on the environment. We have organized this chapter by resource, in the same order they were discussed in Chapter 3.

Direct effects happen at the same time and place as the initial cause or action.

Indirect effects occur later, or are spatially removed from the activity.

Cumulative effects are the effects of actions when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Environmental consequences are the effects of implementing an alternative on the physical, biological, social, and economic environment. They provide the scientific and analytic basis for the comparison of alternatives presented in Chapter 2. They present the expected effects on the physical, biological, social, and economic environments associated with implementation of the alternatives. All significant or potentially significant environmental consequences are disclosed, including the direct, indirect, and cumulative effects. These effects may have consequences that are both beneficial and detrimental. Effects are quantified where possible, although qualitative discussions are often necessary.

In this document, we have identified a time period for the purpose of analyzing both indirect and cumulative effects. This time period is between the date of the Record of Decision (expected January 1996) and the year 2008. It reflects a "reasonably foreseeable future" for which we can project both actions and effects. The year 2008 is the estimated completion date for all planned timber sales identified in the current Chatham Area Timber Sale Planning Schedule.

The cumulative effects analysis in this document tiers to the current Tongass Land Management Plan (TLMP) EIS and Amendment (USDA Forest Service 1970; USDA Forest Service 1986 and incorporates by reference analysis contained in the Supplement to the Draft Environmental Impact Statement (DEIS) for the TLMP Revision (USDA Forest Service 1991d) and its Planning Record. As a result, the projected cumulative effects include what may be expected from long-term implementation of the TLMP. The decisions made in the Forest Plan provide long-range direction for management of the Tongass National Forest for the duration of the plan.

The following assumptions were made to assess reasonably foreseeable effects. These assumptions reflect current management/technology of National Forests and provide a uniform approach to estimating effects of timber harvest and road construction.

- Laws, guidelines, and Best Management Practices (BMPs) for resource protection would be followed. These requirements are expected to be at least as stringent in the future as they are today.
- Timber sale planning would occur in an interdisciplinary fashion.
- All acres of suitable commercial forest land are equally subject to impacts, i.e., timber harvest can occur anywhere on suitable commercial forest land.

4 Environmental Consequences

- The management emphasis of the current TLMP and TLMP Draft Revision for most of the Project Area includes commodity or market resources and their uses.
- The No-Action Alternative would represent only a delay in implementing the TLMP and, based on volume projections, this Project Area would be revisited in approximately 10 years.
- Future effects on resources from timber harvest and road construction will be similar to impacts projected for current alternatives.

The cumulative effects analysis for the Northwest Baranof Project takes into consideration historic timber harvest activity dating from early Tlingit and Russian settlements in the vicinity. It also includes the large scale logging that has taken place since 1956 when the Forest Service entered into the 50 year contract with APC. Finally it considers actions undertaken or planned as a result of RODs for the Kelp Bay, Southeast Chichagof, and Ushk Bay timber sale projects that have been completed in recent years.

Furthermore, a landscape analysis has been initiated for the area around Sitka called the West Baranof and Kruzof Analysis. This Analysis Area includes most of the Northwest Baranof Project Area. The purpose of this analysis is to identify the ecological conditions and processes that occur within the Analysis Area. One of the expected products of the analysis is the identification of areas suitable and available for timber harvest. However, we don't know whether or not any additional timber harvest will be planned for the Northwest Baranof Project Area in the reasonably foreseeable future. As a result, no future harvest is projected for the cumulative effects analysis.

Chapter 4 concludes with other environmental considerations that must be addressed under the National Environmental Policy Act (NEPA) but do not fall under the categories discussed in Chapter 3. These topics include unavoidable adverse environmental effects, the relationship between short-term uses and the maintenance and enhancement of long-term productivity, the irreversible and irretrievable commitments of resources, possible conflicts between the proposed action and the plans of other jurisdictions, and other environmental considerations.

We can reduce or mitigate many adverse effects by limiting the extent or duration of effects. We have specified mitigation measures for project activities to be implemented under the alternatives within standards and guidelines. Throughout this chapter we briefly discuss mitigation measures, and we discuss them in detail in Appendix A.

Physical and Biological Environment

Physical Geography

Geology

Implementation of any one of the action alternatives will have limited or no direct or indirect effect on the minerals and geology resources within the Project Area. There would be no effect to the locatable mineral resources because there are no known or suspected deposits in the area and the potential for their occurrence is considered low based on USGS information and reports.

Road construction or reconstruction, as well as the construction of log transfer facilities (LTFs) will require from 287,560 to 767,335 cubic feet of fill and shot rock, necessitating the development of gravel and rock quarries. For cost effectiveness of road construction, rock quarries should be located no more than three miles apart. The Tongass Land Management Plan identifies in-service needs of between 12,500 and 15,000 cubic yards of common variety minerals to construct each mile of road for timber harvest purposes, and approximately 12,000 cubic yards for each LTF. The effect of each alternative on the salable mineral resources is summarized in Table 4-1.

Table 4-1
Summary of Fill and Shot Rock Needs

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Estimated Cubic Yards of Rock Needed					
New Construction	295,750	259,750	148,960	486,835	0
Reconstruction	95,500	113,500	57,000	106,500	0
Temp. Road Construction	120,000	98,400	81,600	174,000	0
Total Cu. Yards of Rock	**511,250**	**471,650**	**287,560**	**767,335**	**0**

Cumulative Effects

Timber harvesting is currently planned in the Ushk Bay area across Peril Strait to the west of the Project Area. Because road and facility construction are planned as part of the Ushk Bay Project, there will be a demand for common variety mineral resources from the Ushk Bay Project Area and impacts associated with opening rock pits or quarries. We do not expect any rock to be taken from the Northwest Baranof Project Area for the Ushk Bay Sale. Therefore, no additional cumulative effects on the mineral resources in the Project Area are expected from activities in Ushk Bay.

There would be no unavoidable adverse effects of implementing the proposed action.

Caves

Since we did not locate any caves or know that any exist within the Northwest Baranof Project Area, we do not expect any direct, indirect, or cumulative effect on these resources. The limestone deposits and sinkholes we found in the Project Area are within an area deferred from harvest. No activity is proposed at this tim in any alternative within 2.2 miles of this limestone deposit.

Soils

The greatest impact to the soil resource from implementation of the alternatives displayed in the Northwest Baranof EIS will occur as soil erosion. Soil displacement and removal of soil from the forest land base by dedicating this land to roads, landings, borrow pits, and administrative sites will also have an impact. Other types of soil disturbance (soil compaction and reduced permeability) may occur but are of limited extent and will have minor impacts on the soil resource. The degree of soil disturbance varies between VCUs because of watershed characteristics, and between alternatives because of differences in selected harvest units.

Regardless of which action alternative is selected, road construction and logging will cause an increase in sediment production over unmanaged natural conditions and a reduction in long-term soil productivity. Soil productivity will be sacrificed in areas dedicated to roads, landings, and borrow sites. Soils can be damaged irreversibly by compaction or displacement from management activities and by particulate erosion or mass movement following those activities.

Soil erosion resulting from soil mass wasting (landslides) is a factor in alteration of the forest landscape of Southeast Alaska. Impacts from timber harvest and road construction increase potential for soil mass movement over that of natural conditions.

Road construction is one of the greatest contributors to management induced sediment production. Road failures, improper drainage, and erosion of the road surface and cut-and-fill slopes all contribute to sediment production. After a period of time, the majority of erodible soil material from the road surface will have been removed, the cutbanks and fillslopes will become vegetated, and surface erosion will become less serious. Road maintenance and the proper closeout of roads will help prevent road failures.

Timber harvest will also contribute to sediment production. Surface erosion will increase if yarding activities expose the mineral soil by removing the organic mat. Landslides may be triggered by clearcutting. Tree roots, which contribute to the strength of the soil, deteriorate within five to seven years after the trees have been cut. With the loss of the interlocking network of roots, the likelihood of landslides increases.

Clearcutting also opens the forest to the forces of wind and any resulting windthrow would disturb the surface mantle. This would increase surface erosion and on steep slopes could act as a triggering device for debris avalanches and debris flows.

Many of the harvest units in the alternatives would be only partially cut to mitigate various resource concerns. For the purpose of this analysis, however, the values for total acres harvested, total high hazard soils harvested (Table 4-2) are based on the entire area of the units. This was necessary because the portions of the units which will not be cut will not be determined until unit layout. As such, the acreage totals shown in this report are higher than what would actually be cut and impacted under any of the action

alternatives. The values displayed can still be used to compare the alternatives, however, because the harvest method for the individual units will not change between alternatives.

Direct Effects

Total miles of road construction provide a means of comparing the amount of disturbance caused by roading and are an indicator of productivity loss. There is greater mineral soil disturbance as a result of road building activities than from timber harvest operations. Road disturbances are concentrated along a corridor which remains disturbed for a longer period of time. Roads constructed on high hazard soils will experience more mass wasting than those constructed on less hazardous soil. The effects from roads which influence the soil resource are mass movement, sediment production, and loss of productive soil.

Table 4-2 displays the acreage of high hazard soils that are found within proposed harvest units and roads for each alternative. The unit values do not represent the number of acres that will develop problems since only small, isolated slides scattered throughout these hazardous areas would be expected to occur. Road acres are calculated as the portion of land within 25 feet of the centerline of each road. These values provide a relative method of comparing alternatives.

Table 4-2
Acres of Proposed Units and Roads in High Soil Mass Movement Class (MMHaz3), by Alternative and VCU

VCU	Alt. 1		Alt. 2		Alt. 3		Alt. 4	
	Units	Roads	Units	Roads	Units	Roads	Units	Roads
287	42	1	0	0	42	1	42	1
288	215	1	0	0	222	1	222	1
289	0	0	76	0	76	1	76	0
290	0	0	0	0	0	0	0	0
291	103	0	217	0	217	0	217	0
292	126	4	547	5	458	0	549	9
299	52	0	0	0	0	6	52	0
300	110	0	96	1	0	0	164	1
301	100	0	142	0	0	0	142	0
302	81	1	13	1	0	0	153	2
Total	829	7	1,231	8	1,014	8	1,617	14

Long-term and Cumulative Effects

Interlocking tree root systems decompose over a period of five to seven years, resulting in a loss of slope stability after harvest. Sites with a high mass movement hazard may experience up to five times the mass wasting experienced on the same soil under natural forest conditions (Swanston 1989). Slope failures may occur in increasing numbers from three to seven years after timber harvest and then taper off to near stable conditions within fifteen years, after which the site can be said to be "reclaimed" from management-induced mass wasting. In most cases, slope stability will have returned to normal. Nevertheless, past impacted, high hazard soils will have an effect on the amount of sediment produced and delivered to streams. Therefore, acres of units and roads in high mass movement hazard soils are reported cumulatively through the proposed entry (Table 4-3). This provides a relative measure of possible effects for each alternative and for comparing the amount of soil that has a high potential for disturbance from harvest activities.

Impacts from timber management activities on soils include loss of productive growing sites from roads, landings, and borrow pits. Impacts also include impaired soil productivity for vegetative growth resulting from landslides and from scarification and erosion after timber harvest.

Table 4-3
Cumulative Acres of Units and Roads in High (MMHaz3) and Extreme (MMHaz4)* Mass Movement Class Soils for Past and Proposed Harvest

VCU	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
287	402	359	402	402	359
288	216	0	223	223	0
289	0	76	77	76	0
290	0	0	0	0	0
291	386	500	500	500	283
292	1,548	1,970	1,876	1,967	1,418
299	356	304	310	356	304
300	622	609	512	677	512
301	469	511	369	511	369
302	628	561	547	702	547
Total	4,627	4,890	4,816	5,414	3,792

*Includes 158 acres in MMHaz4 from previous harvest and road construction. No additional harvest or road construction are proposed in MMHaz4 soils.
Source: Huecker 1995.

4 Environmental Consequences

Vegetation

Old-Growth Forests

The action alternatives would harvest between 1,613 and 2,993 acres of old-growth forest. This acreage would be permanently converted from old-growth forest to successive stands of younger trees which will be harvested before they mature into old-growth forest. Between 76 and 81 percent of the old growth in the Project Area will remain under all alternatives.

Table 4-4 indicates acres of old growth that remain by VCU. All alternatives provide sufficient acres to meet current TLMP direction for retention of old growth.

Table 4-4
Projected Acres of Remaining Old Growth through 2008

VCU	Acres in 1954	TLMP Retention Acres*	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
287	15,175	1,121	13,513	13,582	13,507	13,506	13,584
288	2,245	84	1,946	2,245	1,943	1,943	2,245
289	3,288	296	3,008	2,947	2,947	2,947	3,009
290	1,736	235	1,587	1,587	1,587	1,587	1,587
291	7,645	293	5,502	5,293	5,297	5,292	5,710
292	12,581	446	8,299	7,589	7,702	7,522	8,607
299	4,600	194	2,801	2,889	2,889	2,801	2,889
300	6,259	2,156	4,884	5,030	5,167	4,831	5,167
301	3,192	234	2,255	2,183	2,405	2,181	2,405
302	7,137	2,199	6,184	5,964	6,448	5,963	6,448
Total	63,858	7,178	49,979	49,309	49,892	48,573	51,651
Percent of 1954 Acres Remaining			78%	77%	78%	76%	81%

Source: Hartmann 1995.
* Acres designated in TLMP to be retained.

Floodplains, Wetlands, and Riparian Areas

Floodplains

The numerous streams in the Northwest Baranof Project Area make it impossible to avoid all floodplains during timber-harvest-related activities. Environmental consequences to floodplains from the alternatives are generally limited to effects from road construction. The small area of floodplains proposed for actual timber harvest would not affect flooding or erosion.

During road construction, both direct and indirect impacts to floodplains can occur. There may be no detectable influence, or there can be flow alteration in minor streams because of routing by roadside ditches and culverts. Channel and flow alteration can locally affect the velocity of the flows, width and depth of water, and the location of flow. Such factors can physically result in different erosion and sediment transport characteristics.

The Forest Services uses BMPs (USDA FSH 2509.22) to minimize impacts on floodplains as well as to protect roads and drainage structures. Examples of such practices include designing bridges and culverts to handle the expected flows, and installing frequent cross drains or ditch relief culverts to minimize erosion from large concentrations of water moving or where they enter natural drainages.

Logging activities are controlled to minimize damage to stream banks and bottoms from yarding, the process of conveying logs to a landing. Large wood in streams that contributes to stream stability and moderation of flow energy and velocity is generally left in place. In cases where large woody debris (LWD) upstream of bridges or culverts could move and block flow, it might be removed to ensure the passage of high flows without causing diversions and erosion.

None of the proposed alternatives would result in human occupancy of floodplains. Because the proposed action would have no floodplain development other than stream crossings, there would be no loss to property values from the proposed actions, nor would human health, safety, or welfare be adversely affected.

Because of the limited changes expected in floodplains as well as the naturally high amounts of precipitation and runoff conditions, the risk characteristics related to flooding would not change to a significant degree as a result of activities performed under each of the alternatives. In general, road location, construction measures, and drainage structures will have negligible impact on the natural and beneficial uses of floodplains in the Northwest Baranof Project Area.

Wetlands

Timber harvest will have some impact on wetlands, and roads in wetlands cannot always be avoided. The total acreage of wetlands harvested and roaded by alternative is displayed in Table 4-5. Impacts may range from none, to altering the soil moisture regime, puddling, compaction, and to a smaller extent, to soil displacement and erosion. Wetlands are seldom logged in a way that prevents them from providing wetland

attributes to the forest system. Harvest of forested wetlands may, however, temporarily alter the hydrology of the site until vegetation is reestablished. Forested wetlands will regenerate timber species after harvest, but at a slower rate than on non-wetland sites.

Table 4-5
Acres of Proposed Units and Roads in Wetlands, by Alternative and VCU

VCU	Alt. 1		Alt. 2		Alt. 3		Alt. 4	
	Units	Roads	Units	Roads	Units	Roads	Units	Roads
287	6	3	0	0	6	3	6	3
288	54	18	0	0	55	18	55	18
289	0	0	5	0	5	0	5	2
290	0	0	0	0	0	0	0	0
291	79	0	125	0	125	0	125	2
292	352	9	176	7	141	9	202	17
299	10	0	0	0	0	0	10	0
300	41	5	2	8	0	0	42	14
301	142	0	1	0	0	0	1	0
302	111	10	195	10	0	0	195	10
Total	796	44	504	25	332	30	642	65

Although wetland loss may occur through road construction, the techniques and measures required during road construction and those used to provide long service life on roads generally preserve the natural values and functions of the affected wetlands. These techniques and measures include the use of permeable subgrade materials to avoid restricting the natural movement of water. They also include the frequent placement of culverts to allow water to pass freely.

Estuaries

Estuaries provide sheltered rearing areas for pink, chum and coho salmon. Direct impacts to estuaries may occur from LTF construction and use. Indirect impacts to estuaries may occur from upland activities (such as timber harvest and road construction) that effect water quality and sedimentation. All estuaries in the Project Area experience a naturally occurring flush of sediment each fall; sediment accumulates in the stream during the summer and is washed downstream by fall rain storms. We display estimated impacts to estuaries in each alternative in Table 4-6. Proposed LTF locations are displayed for each alternative on the enclosed maps.

We propose using a barge-loading log transfer facility at St. John Baptist Bay. This would limit direct effects on the estuary to those caused by road runoff and incidental spillage. Overall, the barge facility would protect an area valuable to juvenile sablefish.

Schools of pink and chum salmon may feed up to two months in estuaries prior to heading seaward or migrating along shorelines (Heard 1991). Sago (1991) reported that only chinook salmon are the only species more dependent on estuaries than chum salmon. There have not been significant increases or decreases in chum salmon escapement in the Project Area from 1960 to 1993 (Halupka et al. 1994).

Bark accumulation at LTFs sites may reduce the biotic productivity in an estuary. In large estuaries, the importance of this loss is diminished because the percentage of unaffected area is large compared to the amount lost. In a small estuary (or in a bight or cove within a large estuary), the loss of productivity may cause deterioration in the remaining areas, at least temporarily (Schultz and Berg 1976).

Marine life forms are directly affected by coverage of bark or by rock fill; this displaces natural habitat. Some species, primarily motile species, appear not to be affected by debris. Bark sloughed during transfer and storage can accumulate, covering the bottom and smothering habitat and sessile organisms. There are indications that water quality around or in bark accumulations is also affected to varying degrees. The amount of dilution or flushing is the main factor determining environmental effects near transfer or storage sites (Faris and Vaughan 1985). The significance of this source of water pollution depends on the quantity and types of logs stored, the duration of storage, and the character and flow of water at the transfer site (Schaumberg 1970). Toxic substances, occurring as leachates from bark, precipitate in salt water; however, leachates do not appear to be a major problem in open water or where good circulation exists (Sedell and Duval 1985).

In general, areas within estuaries are more sensitive to disturbance from LTFs than those areas located on marine systems. Species diversity is an indication of habitat quality. LTFs located in areas with higher numbers of species generally exhibit higher value habitat than those with lower numbers of species present (Schultz and Berg 1976). Underwater dive reports conducted at the LTF sites (Appendix E) identify the species found at the time of the dive and their abundance. Flow and dispersement rates were also observed and recorded in the dive reports.

Each of the estuaries affected are larger than 50 acres and would have the ability to absorb the scale of impact which might result from the LTFs proposed in each alternative At each of the proposed LTF locations, the percentage of estuarine benthic habitat subject to direct effects would be less than 1.5 percent (Table 4-6). Table 4-7 displays the estimated percent of estuary affected by bark and rock fill for each alternative.

Table 4-6
LTF Estimated Direct Effects to the Estuarine Marine System

VCU	LTF Name	Est. Fill Acres	Impact Bark Acres	Estuary Acres	Percent Estuary Impacted
287	Schulze Cove	0.2	1.0	0	0.00
292	Rodman Bay	0.2	1.3	186	0.81
292	Rodman Bay NE	0.2	0.9	0	0.00
293	Appleton Cove	0.0	0.0	507	0.00
299	Noxon Creek	0.2	0.5	193	0.36
300	Nakwasina Passage	0.2	0.5	86	0.81
301	Lisa Creek	0.2	0.5	55*	1.27
301	Lisa Creek N	0.2	0.5	55*	1.27
302	St. John Baptist	0.1	0.0	71*	0.14
302	St. John Baptist S.	0.5	0.0	71*	0.70
	Total	1.9	5.2	1,098	0.65

* Duplicate acres. These acres were only counted once toward total acres.
Source: Allio 1995.

Table 4-7
Impact of Fill and Bark on LTF Sites by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
No. of LTF Sites	6	4	3	7
% Estuary Impacted	0.6	0.3	0.8	0.7

Source: Allio 1995.

Riparian Areas

Riparian areas are a transitional zone between the aquatic ecosystem and the adjacent terrestrial ecosystem. Riparian areas are identified by wet soils or plants that require abundant water. The NFMA regulations direct that special attention shall be given to land and vegetation for approximately 100 feet from the edges of all perennial streams, lakes, and other bodies of water. This area shall correspond to at least that of the recognizable area dominated by the riparian vegetation (Section (e) of 36 CFR 219.27). BMP 12.6 in the Soil and Water Conservation Handbook directs that riparian areas are

managed for the primary purposes of protecting or enhancing water quality and fisheries habitat.

Table 4-8 displays miles of existing road, proposed miles of road to be reconstructed, and proposed miles of new road construction in riparian habitat for each VCU by alternative. Of the action alternatives, Alternative 3 proposes the least amount of road construction or reconstruction in riparian habitat. Alternative 4 proposes the greatest amount of road construction or reconstruction in riparian habitat.

Table 4-8
Miles of Existing and Proposed Roads in Riparian Areas (by VCU and Alternative)*

VCU	Existing Riparian Roads (miles)	Proposed Reconstruction (Miles in Riparian Areas)				Proposed New Construction (Miles in Riparian Areas)			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 1	Alt. 2	Alt. 3	Alt. 4
287	6.2	0	0	0	0	0	0	0	0
291	9.9	2.2	4.8	4.8	4.8	0	0	0	0
292	21.0	3.3	3.3	3.3	3.3	0.1	0.1	0.1	0.1
299	7.6	0	0	0	0	0	0	0	0
300	6.1	2.2	0	0	2.7	0.1	0	0	0.1
301	2.2	0.1	0.5	0	0.1	0.3	0	0	0.3
302	2.0	0.8	0.8	0	1.0	0	0	0	0
Total	55.0	8.6	9.4	8.1	11.9	0.5	0.1	0.1	0.5

* VCUs with no existing or proposed roads in riparian areas are not listed in this table.
Source: Lorenz 1995.

Table 4-9 displays the acres of proposed harvest units in riparian habitat for each VCU by alternative. In addition, it identifies the unit (by number) in which harvest is proposed. There is very little difference between the alternatives in the amount of riparian habitat that would be harvested. Much of the riparian habitat (10.3 acres) is within a single proposed unit, Unit 3143, which is in a watershed that flows into Rodman Bay. Unit 3143 is proposed for overstory removal (70% of the stand volume) by helicopter, which will help to minimize impacts to the riparian area. The unit is proposed for harvest in Alternatives 2, 3, and 4.

Table 4-9
Proposed Harvest Units in Riparian Areas (by VCU and Alternative)

VCU Unit No.	Riparian Acres	Alt. 1	Alt. 2	Alt. 3	Alt. 4
291					
1131	0.4		x	x	x
1211	5.9		x		x
1252	2.0	x	x	x	x
1275	4.3	x	x	x	x
292					
3143	10.3	x	x	x	x
300					
7163	0.4	x			x
301					
9011	1.8	x	x		x
Total Acres Riparian Harvest		18.8	24.7	17.0	25.1

Source: Lorenz 1995.

Water

Increased stream sedimentation in the Northwest Baranof Project Area is likely to result from timber harvest and road construction on soils with high landslide risk. Sediment will also be generated by road construction in riparian areas and from erosion of drainage facilities of long term forest roads. However, the overall effects on beneficial use of water resources within the Project Area should be negligible. The ratings for mass wasting potential risks are given below.

The potential risk of sediment transfer from mass wasting events associated with harvest and roads was analyzed for each VCU and drainage basin using an approach similar to that described by Hogan (1989). The analysis reports the mileage of roads and acres within harvest units with high sediment delivery potential to Class I anadromous fish streams. Sediment delivery to Class I streams is broken down into two separate categories: **direct** delivery to Class I streams and **indirect** delivery to Class I streams from Class II or III tributaries. Potential for direct and indirect sediment delivery is shown by alternative in Table 4-10 for harvest units, and Table 4-11 for proposed roads.

Table 4-10
Acres of Harvest Units on High Hazard Soil (MMHaz3) with Direct or Indirect Sediment Delivery Potential

VCU	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
287	0	0	0	0	0	0	0	0
288	162	46	162	46	162	46	162	46
289	0	0	0	0	0	0	0	0
290	0	0	0	0	0	0	0	0
291	0	67	104	73	104	73	104	73
292	69	15	69	58	69	58	69	58
299	27	14	27	14	0	0	27	14
300	57	44	58	54	0	0	74	88
301	43	60	44	98	0	0	44	98
302	27	10	27	10	0	0	27	10
Subtotal	385	256	491	353	335	177	507	388
Total	641		844		512		895	

Source: Kelliher 1995.

Table 4-11
Acres of Proposed Road Construction on High Hazard Soil (MMHaz3) with Direct or Indirect Sediment Delivery Potential

VCU	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
287	0	0	0	0	0	0	0	0
288	4.8	16.8	0	0	4.8	16.8	4.8	16.8
289	0	0	0	0	0	0	0	0
290	0	0	0	0	0	0	0	0
291	0	0	0	0	0	0	0	0
292	4.8	0	3.6	0	4.8	0	4.8	0
299	2.4	1.2	0	0	0	0	0	1.2
300	5.4	1.8	4.8	2.4	0	0	6.6	2.4
301	2.4	0	2.4	0	0	0	2.4	0
302	8.4	7.2	6.0	9.0	0	0	7.2	10.8
Subtotal	28.2	27.0	16.8	11.4	6.4	16.8	25.8	31.2
Total	55.2		28.2		26.4		57.0	

Source: Kelliher 1995.

Results of this mass wasting risk assessment for **units** in the Northwest Baranof action indicate that Alternative 3 has the lowest overall risk of sediment delivery to streams, and Alternative 4 has the highest potential risk.

The situation is different for **road** impacts. Alternative 3 has the lowest potential impact and Alternative 1 has the highest.

Alternative 4 rated highest because it had the highest mass wasting potential from critical stream crossings and harvest units and the second highest risk for road induced sediment. Alternative 1 was rated second overall due to having the highest risk from road mass wasting and critical stream crossings. Road erosion is weighted more heavily than unit erosion. Road ditch lines transport sediment generated by cut banks and road grading to the stream network for the operating life of the road. Mass wasting sediment from harvest units is infrequently transported to the stream network and is given less weight in the rating (Swanston and Marion 1992).

We do not expect any measurable changes in stream temperature, dissolved oxygen, or stream nutrient cycles as a result of timber harvesting activities planned in Northwest

Baranof watersheds. Riparian management prescriptions should minimize water quality and fish habitat concerns associated with these issues.

We based cumulative watershed effects related to streamflow on total percent of the watershed harvested by alternative. Only VCUs 291 and 292 are sensitive to minor changes in stream runoff as a result of cumulative harvest in Alternatives 2, 3 and 4. Cumulative effects on soil erosion and sediment delivery will come more from roading than timber harvest. Roads have a higher mass movement hazard and are a continuous source of fine sediment.

4 Environmental Consequences

Fish

Minimum 100 foot buffer zones are provided on both banks of all fish streams.

Fish resources in the Northwest Baranof Project Area are important to subsistence, recreation, and commercial users. Guidance for protecting fish resources is provided by:

- the National Forest Management Act regulations (NFMA), in 36 CFR 219.27 (e);
- the Region 10 Aquatic Habitat Management Handbook (FSH 2609.24), June 1986;
- the Tongass Timber Reform Act (TTRA); and
- the Region 10 Soil and Water Conservation Handbook (FSH 2509.22).

Best Management Practices (BMPs) and the use of buffer zones are likely to assure protection of riparian and potential fish habitat. On the Sitka Ranger District, fisheries biologists search every unit with potential fish habitat and protect potential fish habitat with a minimum 100' (horizontal measure) buffer on each stream bank, regardless of size, streamflow, or presence of fish at the time of the survey.

With the protection provided by these measures, the primary impacts to fish habitat and water quality are from:

- unplanned events such as soil mass wasting, or large scale blowdown;
- roading through wetlands, streams or riparian areas;
- sediment from roads;
- short term changes in the magnitude and frequency of stream discharge due to timber harvest; and
- short term changes in the magnitude and frequency of stream discharge due to interception of groundwater flows by road cuts, and by consolidation and redirection of flows by road drainage structures.

Habitat Capability

We base the habitat capability models for coho salmon and Dolly Varden char on amounts of large woody debris (LWD) in the stream. With the application of BMPs and TTRA buffer strips, we do not expect any quantifiable effects on coho salmon or Dolly Varden char in any alternative.

Pink salmon habitat capability models are based on potential survival of eggs and emerging fry in the spawning gravels. Researchers have linked survival to water quality criteria including intragravel sediment, water flow, and temperature. As with coho salmon and Dolly Varden char, application of BMPs and TTRA buffer strips should minimize sediment delivery for all action alternatives.

Unplanned impacts to water quality and fish habitat may occur. These impacts may include landslides, blowdown of leave strips, use of construction materials which break down at a rapid rate, washout of bridges or culverts, and failure of bridges or culverts to pass fish where planned. The risk of unplanned impacts is not quantifiable and increases with any development, including increased timber harvest and road construction. Alternatives affecting greater proportions of high hazard soils have the potential for increased sediment delivery to fish streams.

We can use the number of stream crossings and the total acres of units and roads within riparian areas to display potential impacts to fisheries and water quality. Roads constructed within the riparian area can constrict the floodplain and channel resulting in changes in channel shape and associated habitat. Many small, individually insignificant impacts can accumulate to subtle or significant impacts. Table 4-12 displays the number of stream crossings in each VCU by alternative. We did not include VCUs 287, 290, and 299 in the table because, no stream crossings are planned in these VCUs in any alternative.

Table 4-12
Stream Crossings by Alternative

VCU	Alternative 1 Crossings		Alternative 2 Crossings		Alternative 3 Crossings		Alternative 4 Crossings	
	Class I	Class II	Class I	Class II	Class I	Class II	Class I	Class II
288	1	2	0	0	1	2	1	2
291	3	0	10	0	10	0	10	0
292	6	2	5	2	6	2	6	2
300	8	1	4	0	0	0	10	1
301	1	1	2	1	0	0	1	1
302	10	1	6	4	0	0	8	4
Total	29	7	27	7	17	4	36	10

Source: Lorenz 1995.

4 Environmental Consequences

Wildlife

Wildlife Habitats

In Chapter 3, we briefly described wildlife habitats (beach fringe, estuary fringe, riparian, old growth, second growth and alpine/subalpine). Each action alternative includes harvest of wildlife habitat. We will significantly reduce impacts to beach fringe, estuary fringe, and riparian habitats in each alternative by application of unit design criteria, BMPs (FSH 2509.22, 1991), and legislated protective measures such as TTRA.

Except for the no action alternative, each alternative would have a direct effect on all but the alpine/subalpine wildlife habitats. The most impact in any alternative is to old-growth forest habitat; it would be altered from old growth to early successional habitat. Table 4-13 summarizes effects of all four action alternatives on each habitat type.

Table 4-13
Acres of Wildlife Habitats in Proposed Harvest Units and Roads by Alternative

Habitat Type	Existing Acres	Alt. 1		Alt. 2		Alt. 3		Alt. 4	
		Units	Roads	Units	Roads	Units	Roads	Units	Roads
Beach Fringe	3,211	1	4	3	3	0	3	3	7
Estuary Fringe	3,871	1	22	1	18	0	7	1	21
Riparian	8,742	10	60	25	64	18	51	26	83
Old Growth	51,651	1,613	95	2,289	88	1,731	51	2,993	139
Second Growth	10,070	1	58	28	63	27	48	28	84
Alpine/Subalpine	30,604	0	0	0	0	0	0	0	0

* Total acres do not exactly match total harvest acres because there is some overlap in habitat types. For example, some riparian areas include old-growth or second-growth habitat.
Source: Hartmann 1995.

Alternative 4 would have the greatest direct impacts on the majority of the habitats discussed here (beach fringe, old-growth forest, second-growth forest and riparian. Alternative 2 would have the greatest impact to estuary fringe habitats, followed closely by Alternatives 4 and 2. Alternative 2 has the second greatest impact to beach fringe, old growth forest, second growth forest, and riparian habitats. The no action alternative (Alternative 5) would have no direct or indirect effects on any of the habitats discussed here. Of the action alternatives, Alternative 3 would have the least impact on the majority of the habitats.

Wildlife Species and Habitat Capability

We use habitat capability models to estimate the ability of a habitat to support wildlife populations. Although current population levels are unknown, the habitat capability models provide a tool for measuring and comparing effects of proposed alternatives on wildlife habitats. These mathematical models assume relationships between deer harvest activity, deer populations, and deer habitat. The numbers generated by the models are intended to represent the number of deer present in each WAA at any time. However, the actual populations levels could be significantly higher, or lower, that the model estimates suggest (Kruse 1993). As a result, the habitat capability should only be used as a basis for comparing alternatives, not for any comparison with actual past or future population levels.

Silvicultural Prescriptions

Since the mid-1900s clearcutting has been the primary silvicultural system used in Southeast Alaska. Therefore, few studies have been done in Southeast Alaska on the effects to wildlife of using silviculture systems other than clearcutting. One recent study of the effects of overstory removal (20% and 40% of basal area removed) on subsequent deer use, conifer regeneration, blowdown, and logging damage has presented some interesting results (Doerr 1995). The study indicates that removal of timber has increased deer use, especially in the 40% harvest area. This study also indicates that additional timber harvests that use overstory removal should be undertaken with appropriate research, study, and monitoring of effects.

Because we lack information on effects of alternative silvicultural systems on wildlife, we give harvested areas the same habitat capability value, regardless of the silvicultural treatment proposed (i.e., the effects of clearcut harvest and group selection are considered to be equal in the habitat capability models).

The wildlife habitat capability models were designed to reflect only the effects of clearcutting. As a result, the effects indicated by the models are more severe than we would actually expect. We expect effects on wildlife populations to be less than that predicted by the habitat capability model in areas where the silvicultural treatment leaves a large percentage of the unit standing. An example is the group selection silviculture system which harvests only 20 percent of the unit. We expect the harvest of selected gaps to have little effect on habitat capability for deer in the short term. Subsequent harvests would increase impacts. Where the majority of a unit is cut (clearcut with reserve trees and the seed tree cut), we expect that affects on wildlife populations similar will be similar to those predicted by the habitat capability models. Silvicultural treatments are discussed in greater detail in Chapter 2 of this EIS.

Logging methods (helicopter yarding and cable yarding) influence the arrangement of the trees left in the unit. Helicopter yarding provides the most flexibility in the arrangement of trees left standing. In general, trees left standing will most likely be clumped into small groups because of yarding restrictions, safety concerns, and blowdown considerations. Standing live trees would provide stand diversity, wildlife habitat, and a future source of snags.

4 Environmental Consequences

Overstory removal silvicultural systems have the most variable effect on wildlife depending on the percentage of the volume that is removed and the amount of residual stand that is left after the harvest operations. For the Northwest Baranof Project Area overstory removal silvicultural prescriptions range from cutting 40 to 90 percent of the volume. Because of the structure of most of the old-growth stands, removing 40 to 90 percent of the volume could result in removing only 20 to 50 percent of the overstory because much of the total stand volume is tied up in relatively few large trees per acre (Dougan, 1995).

Sitka Black-Tailed Deer

Harvesting old-growth forest in the Project Area would reduce the suitability of habitat for Sitka black-tailed deer. Four types of impacts to deer result from clearcutting old-growth forest (Hanley 1984):

- logging slash makes it difficult for deer to pass through clearcuts, and reduces available habitat;
- lack of snow interception in clearcuts reduces the availability of forage during winter;
- the nutritional quality of plants growing in open sunny clearcuts would be lower than plants growing in shaded old-growth forests; and
- forage production would be significantly reduced following canopy closure of the regenerating forest, and would remain low for at least 100 years.

Table 4-14 displays habitat capability index and for deer for each alternative. Alternative 5 reflects existing habitat capability. Overall for the Project Area, the greatest reduction in habitat capability is 2 percent under Alternative 4. However, up to 6 percent of the reduction in habitat capability could be in any one VCU. VCUs 292, 291, and 288 have the greatest potential reduction in habitat capability.

Table 4-14
Resulting Habitat Capability Index for Sitka Black-tailed Deer in the Project Area by Alternative

WAA	VCU	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
3001	299	183	185	185	183	185
	300	588	593	596	587	596
	301	214	213	218	218	218
	302	888	881	896	896	896
3312	288	162	168	162	162	168
	289	210	209	209	209	210
	290	101	101	101	101	101
3313	291	343	337	337	337	349
	292	542	518	522	516	549
3314	287	946	948	946	946	948
WAA Total		8,152	8,127	8,146	8,110	8,195
Project Area Total		4,177	4,152	4,171	4,134	4,220

Source: Hartmann 1995.
Note: Habitat capability model assumes clearcutting of all harvest units so exagerates the effects of the alternatives.

Brown Bear

Research on Chichagof Island indicates that brown bears generally avoid clearcuts, possibly because other sites provide more nutritious foraging and better cover (Schoen and Beier 1989). Roads significantly improve human access and consequently increase disturbance as well as human-induced mortality of bears. In general, roads are detrimental to bears because they increase opportunities for human-bear interactions. However, the habitat capability index shown here does not show a reduction in habitat capability due to road construction. The habitat capability models are being modified to perform the calculations, but this work has not been completed.

Table 4-15 displays habitat capability index for bear for each alternative. Alternative 5 reflects existing habitat capability. Overall for the Project, brown bear habitat capability could be reduced by no more than 2 percent. The effect on any VCU is no more than 3 percent.

Table 4-15
Resulting Habitat Capability Index for Brown Bear in the Project Area by Alternative

WAA	VCU	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
3001	299	23	23	23	23	23
	300	15	15	15	15	15
	301	8	7	8	7	8
	302	16	16	16	16	16
3312	288	9	9	9	9	9
	289	11	11	11	11	11
	290	7	7	7	7	7
3313	291	15	15	15	15	15
	292	28	27	27	27	28
3314	287	51	51	51	51	51
Total		183	181	182	181	183

Source: Hartmann 1995.
Note: Habitat capability model assumes clearcutting of all harvest units so exagerates the effects of the alternatives.

Marten

Harvesting old-growth forest in the Northwest Baranof Project Area would reduce habitat for marten. Clearcutting eliminates resting sites, winter hunting sites, overhead cover, and preferred prey (Suring et al. 1992). Marten generally avoid open habitats such as clearcuts because deep snow during winter and dense vegetative growth during summer prevents successful foraging (Steventon and Major 1982). Populations of red squirrels, a primary food source for marten in Southeast Alaska, have been shown to decline significantly following clearcutting (Wolff and Zasada 1975; Medin 1986). Although clearcuts retain some habitat value for marten because residual slash provides overhead cover and some less-preferred prey species are available, research results indicate that clearcut use by marten is very limited in Southeast Alaska (Suring et al. 1992).

Table 4-16 displays habitat capability index for marten for each alternative. Alternative 5 reflects existing habitat capability. Overall for the Project Area, marten habitat capability could be reduced by up to 4 percent. The effect on any one VCU could be as much as a 10 percent reduction in habitat capability. VCUs 288, 291, 292, and 301 show the greatest potential effects. Habitat capability indices shown here do not reflect the reductions in habitat capability due to road construction. The habitat capability models are being modified to perform the calculations, but this work has not been completed.

Table 4-16
Resulting Habitat Capability Index for Marten in the Project Area by Alternative

WAA	VCU	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
3001	299	13	14	14	13	14
	300	23	24	24	23	24
	301	9	8	9	8	9
	302	35	34	36	34	36
3312	288	12	13	12	12	13
	289	16	16	16	16	16
	290	8	8	8	8	8
3313	291	26	25	25	25	27
	292	39	36	36	36	39
3314	287	70	71	70	70	71
Total		251	249	250	245	257

Source: Hartmann 1995.
Note: Habitat capability model assumes clearcutting of all harvest units so exagerates the effects of the alternatives.

Mountain Goat

The primary considerations in the evaluation of habitat for mountain goat in Southeast Alaska are availability of food and proximity to escape terrain (Suring et al. 1988). Important components of the habitat capability model for mountain goat include cliffs, distance from cliffs, location, aspect, and vegetation. Escape cover is of such key importance that the model has no habitat value for habitats greater than ½ mile from cliffs.

The greatest potential affect to goat populations from timber harvest and road building activities is from an increase in human access. Hunted populations of mountain goats are sensitive to disturbance, poaching, and over harvest following the establishment of human activities in occupied habitat. Roads that increase access to alpine habitat should be closed to reduce potential impacts to mountain goats. Alternatives 1 and 4 propose harvest in VCU 300 and potentially increase access to Annahootz Mountain, a popular goat hunting destination. VCU 300 is within the Project Area WAA with the highest goat harvest (WAA 3001). Road management objectives for both of these alternatives propose Level 1 maintenance and elimination of the road after harvest. These are the most restrictive post-harvest safeguards that can be taken. Special hunting regulations may need to be enforced during logging and road construction activities if they occur during goat hunting season.

Table 4-17 displays habitat capability index for mountain goat for each alternative. Alternative 5 reflects existing habitat capability. A reduction of up to 3 percent of the habitat capability may result from the proposed actions. This equates to the capability of the habitat to support one goat. Habitat capability indices shown here do not reflect reductions in habitat capability due to road construction. The habitat capability models are being modified to perform this task, but the work has not been completed.

Table 4-17
Resulting Habitat Capability Index for Mountain Goat in the Project Area by Alternative

WAA	VCU	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
3001	299	37	37	37	37	37
	300	6	6	6	6	6
	301	6	6	7	6	7
	302	0	0	0	0	0
3312	288	0	0	0	0	0
	289	0	0	0	0	0
	290	0	0	0	0	0
3313	291	1	1	1	1	1
	292	6	6	6	6	6
3314	287	7	7	7	7	7
Total		63	63	64	63	64

Source: Hartmann 1995.

Bald Eagle

Nesting bald eagles are vulnerable to human disturbance. However, because they vary considerably in their response to human activity, it is difficult to predict the effects of specific disturbances on individual eagles (Sidle et al. 1986). Potential disturbance activities of proposed project actions include road construction, timber harvest, helicopter flights, and truck and heavy equipment traffic. Decreased survival or productivity of nesting bald eagles is an important management concern (Sidle et al. 1986). The Bald and Golden Eagle Protection Act protects the bald eagle and protects their nests from harm. Under a Memorandum of Understanding (MOU) between the Forest Service and the Fish and Wildlife Service (FWS), bald eagle nesting habitat and activities are to be protected by a minimum 330-foot radius habitat management zone around each bald eagle nest tree. Activities inconsistent with current bald eagle use are restricted within this zone. In addition to the protective zone, the MOU recommends that a continuous fringe of mature trees, 660 feet wide, be maintained along the coastline to provide perching and winter roosting habitat for bald eagles and that repeated helicopter flights be avoided within one-quarter mile of active bald eagle nests, and that helicopter logging flight corridors maintain at least a one-quarter mile distance from the nests.

Variances from the MOU must be obtained if encroachment upon the minimum 330-foot zone by a proposed land use activity appears unavoidable. A query of the GIS data base of eagle nests in the Project Area have identified 5 bald eagle nest trees which in one or more alternatives are within 330 feet of an existing road proposed for reconstruction. No eagle nest trees were identified within 330 feet of a proposed harvest unit or within 330 feet of a road proposed for new construction (Table 4-18). Variances have not yet been obtained to re-enter the 330-foot zones of the 5 potential bald eagle nest trees in the Northwest Baranof Project Area. The volume of timber accessed by each road affected is displayed in Table 4-xx. If we are unable to secure variances from the U. S. Fish and Wildlife Service, this timber could not be reached.

Table 4-18
Potential Bald Eagle Variances

Eagle Tree Number	VCU	Road Number	Volume of Timber Accessed by these Roads by Alternative			
			1	2	3	4
12325007	301	7558*		5.4		
12325013	292	7586	7.1	24.8	24.8	24.8
12325072	300	7574	2.9			2.9
12325077	302	75831*	7.6	13.1		8.7
12325091	292	7587	7.1	24.8	24.8	24.8

* An alternate route is available to access this timber.
Source: Hartmann 1995.

4 Environmental Consequences

Comparison of Alternatives

The main direct effect on wildlife habitats under each action alternative is reduced habitat capability of the Project Area for each species. Table 4-19 shows a summary of the reduction in habitat capability by species and alternative. Alternatives 4 and 2 would result in the greatest reductions in habitat capability for wildlife because the most old-growth forest would be harvested under these alternatives.

Both direct and indirect effects on habitat capabilities for wildlife are largely unavoidable under all action alternatives since the effects are a result of timber harvest. Effects have been mitigated under all alternatives by maintaining a minimum 100-foot stream buffer on all Class I and II streams and expanding this where feasible (Lisa Creek and Range Creek) to a larger riparian buffer to accommodate animal species, such as brown bear, which are highly dependant on riparian habitats. Other mitigation measures include buffering estuaries and beach fringe from most proposed actions. Road closures could further mitigate for proposed management actions.

Logging Camps

From a wildlife perspective, there are two types of effects associated with an LTF and logging camp. First, there is the potential loss of wildlife habitat as a result of clearing activities for the camp, sort yard, and associated facilities. Second, and more importantly, there is the disturbance to wildlife as a result of increased human activity associated with a camp. Both of these effects are addressed in more detail in the Subsistence section of the Draft EIS.

The amount of habitat lost is relatively minor. Whenever possible, camps and sort yard facilities are located away from the highest quality habitat. The difference between a log slide and a bulkhead facility are inconsequential in their effects on wildlife. The objectives are to avoid eagle nest sites and estuarine habitat.

Wildlife may be adversely affected by human activity associated with the camps and facilities. This includes disturbance of wildlife use patterns, increased harvest, and increased human-bear encounters. These effects are minimized when the camp facilities are on a barge (floating camp) as opposed to being located on the uplands. The overall effects of disturbance of the wildlife use patterns are expected to be minor.

Cumulative Effects

Cumulative effects result from the incremental impacts of past, present, and reasonably future actions by federal agencies or other organizations. Cumulative effects in the Project Area result from past timber harvest, the proposed actions, and timber harvest in the reasonably foreseeable future.

The change in habitat capability resulting from previous harvest in the Project Area ranges from 17 percent to 46 percent for Sitka black-tailed deer, brown bear, and marten. Cumulative changes in habitat capability are shown in Table 4-19.

Table 4-19
Cumulative Percent Reduction in Habitat Capability Index in the Project Area by Alternative as a Result of Past and Proposed Timber Harvest

Species	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5 No Action
Sitka Black-tailed Deer	-18	-19	-18	-19	-17
Brown Bear	-12	-12	-12	-12	-11
Marten	-21	-22	-21	-23	-19
Mountain Goat	-2	-3	-<1	-3	0
Bald Eagle	-51	-51	-51	-51	-51

Source: Hartmann 1995

Long-Term Productivity

Primary long-term impacts on wildlife result from loss of old-growth habitat. Sitka black-tailed deer, brown bear, marten, river otter, hairy woodpecker, and brown creeper depend on old growth and would experience decreases in long-term habitat capability, particularly during critical times of the year. Habitat capabilities for brown bear and marten would decline further if roads are left open, resulting in human-related disturbance and mortality. All wildlife species are expected to be above minimum viable levels within the Ecological Province and their occurrences are anticipated to remain well distributed throughout the Project Area.

Canopy closure in second-growth stands will result in reduced habitat capability for deer, marten, and brown bear. Thinning second-growth stands could delay canopy closure to offset negative impacts of post-harvest succession.

Biological Diversity

The diversity of plant and animal species in the Project Area would not be affected by the proposed action. All alternatives are expected to maintain viable populations of all plant and animal species in the Project Area.

4 Environmental Consequences

Marine Environment

Marine Fish

The effects of LTFs on fish resources have not been quantifiably demonstrated. It is unlikely that any effects on returning adult fish would occur. LTF siting guidelines require a 300-foot buffer from the mouth of a Class I stream. Juvenile pink and chum salmon that spend several months immediately after migration out of the streams in protected bays and coves would more likely be affected by activities in the marine environment. These small fish are highly mobile as they actively feed on marine invertebrates. Some of their preferred food items live on the ocean bottom. Bark accumulation and the area under the embankment of an LTF generally eliminates less than one percent of the habitat area of their prey species based on the size of estuary and the regional average of bark accumulation of 1.96 acres (Faris and Vaughn 1985). The average embankment footprint range of 0.1 to 0.5 acres (depending on type of structure) is unlikely to cause measurable adverse consequences.

There is no formal documentation that LTF structures or activities associated with their use conflict with commercial fishing near the facility. No adverse consequences on commercial fishing are anticipated as the result of LTF locations.

Camps associated with an LTF site may cause additional competition for fish and marine resources. Under allocation direction in ANILCA Sec. 804, users who have customary and traditional use histories for an area may be given harvest priority over users who do not.

Marine Shellfish

The potential impacts that are of concern at log transfer sites relate primarily to bark deposits which smothers benthic organisms. The rate of bark accumulation varies with conditions at each facility. The design of the facility partially determines the amount of bark lost (loss of bark has been directly related to the speed of log entry into the water), and the configuration of the location determines the dispersion of bark by currents and winds. Log raft storage areas accumulate bark at a much slower rate than the immediate area of the log transfer facility. Little quantified information is available that documents decomposition, flushing, recovery times, recolonization rates, or other information about the longevity of bark and its effects on the marine benthic habitat.

An effect of bark and debris accumulation is that little-neck clams and bay mussels have been shown to be eliminated when as little as 4 to 5 inches of bark accumulated (Freese and O'Clair 1984). Further, Conlan and Ellis (1979) reported molluscs and several polychaetes were excluded by bark debris greater than 2.5 centimeters in thickness, and the effects of bark may last several decades. Deposition of more than a 1-centimeter layer of wood waste has been observed to produce losses of suspension feeding benthos, with major community composition changes associated with a 5-centimeter accumulation (Conlon and Ellis 1979). In 15-centimeter deposits, suspension feeding organisms were absent and the area was dominated by a few abundant deposit feeding organisms. It can be assumed that other plants and animals that live in and on the bottom would be similarly affected.

Freese (1987) indicates that once benthic deposits of bark are in place, they are very resistant to decomposition or transport away from the immediate area. In general, however, the area impacted by bark is relatively restricted.

Direct Effects

Direct effects to the marine environment are those that occur in the same time or same place as the current timber harvesting and road construction activities. In terms of LTFs, direct effects are limited to the intertidal area affected by rock fill at the LTF site (see proposed LTF locations on enclosed Alternative maps).

In most cases, the intertidal zone affected by rock fill for the facility would range from 0.1 acre up to 0.5 acre. Bark accumulation varies from location to location depending on slope of the benthic bottom, and tidal and wave action. The impacts are estimated to be comparable to LTFs nearby, or approximately 1.96 acres at each site (a regional average based on a study of 32 LTFs in Southeast Alaska) (Faris and Vaughan 1985).

Indirect and Cumulative Effects

Rock fill for either a drive down ramp or a bulkhead facility would not increase or decrease based on log facility use, and those effects are addressed in the Direct Effects section.

Bark depth may increase slightly, but the area covered would not be expected to increase with reuse of the previously used LTF sites at Rodman Bay, Noxon Creek, and Lisa Creek. Schulze Cove has been used as a log rafting area. Bark deposits would not be significantly increased by use of the proposed LTF. At the proposed barge facility in St. John Baptist Bay, there would be little to no bark accumulation because logs will not be placed directly in the water. The same would hold true with the Appleton Cove barge site.

Rock fill or riprap, though it may cover the current habitat, also provides habitat for future colonization by marine species (Forest Service 1986). Through the years, either the rock fill or the regraded beach at each LTF location would be expected to recolonize with species similar to those currently occurring in the region, thereby maintaining productivity of the marine habitat.

Endangered Species

Wildlife

Three federally listed and five federal candidate wildlife species occur in or adjacent to the Northwest Baranof Project Area.

Humpback Whale

The only proposed activities likely to result in impacts to humpback whales are the development and use of log transfer facilities (LTFs) and their associated camps and the movement of log rafts from LTFs to mills. Construction and operation of LTFs and other docking facilities are restricted to small, very localized areas of the marine environment. Construction and operation of LTFs are unlikely to affect prey availability for humpback whales.

Humpback whales could be disturbed by increased boat traffic associated with LTFs. Disturbance impacts would be localized in nature, and would be highly variable, depending on many factors, such as the size of the bay, water depth, number of boats, and individual behavioral responses of humpback whales. Behavioral responses could include sounding, breaching, evasive underwater maneuvers, and maintaining distance.

Steller Sea Lion

Harassment or displacement of Steller sea lions from preferred habitats by human activities such as boating, recreation, aircraft, log transfer facilities, and log raft towing is a concern with regard to long-term conservation of the sea lion in Southeast Alaska. LTF construction and operation are unlikely to affect prey availability for Steller sea lions, since these and related activities are restricted to small, very localized areas of the marine environment. In addition, the permitting process for LTFs requires that monitoring be conducted to maintain water quality and marine circulation and flushing during construction and operation of LTFs. As a result, prey for Steller sea lions is unlikely to be affected.

American Peregrine Falcon

The American peregrine falcon would not be affected as a result of any of the proposed alternatives. This species occurs in Southeast Alaska only during migration. Peregrine falcons generally occur in areas of high prey densities, such as seabird rookeries or waterfowl concentration areas. No seabird rookeries or waterfowl concentration areas are located in the Northwest Baranof Project Area.

Candidate Species - Category 2

Marbled Murrelet

Marbled murrelets are common in Southeast Alaska and nest in old-growth forest stands up to 53 miles from saltwater. Marbled murrelets more commonly occupy larger stands (greater than 500 acres) than smaller stands (less than 100 acres). Since all inland forest stands in the Northwest Baranof Project Area are less than eight miles from salt water, all could be potential marbled murrelet nesting habitat. Without precise knowledge of marbled murrelet nesting habitat requirements, all old-growth habitat with greater than 8 mbf per acre is assumed to be suitable for nesting.

All action alternatives will harvest stands which may be capable of providing nesting habitat for marbled murrelets. The factors currently limiting marbled murrelets in Southeast Alaska have not been identified. Assuming that availability of nesting habitat is a limiting factor for the population, then a reduction in availability of nesting habitat could result in a proportional effect on the population. In the Northwest Baranof Project Area, between 0.72 and 4.53 percent of the old-growth forest habitat would be harvested, potentially resulting in a comparable reduction in habitat capability for the marbled murrelet within Project Area.

In summary, the Northwest Baranof Project may affect marbled murrelets, but the extent of this impact cannot be determined at this time. The Project Area is only a small fraction of the presumably suitable habitat in Southeast Alaska and any effects from this project would have minimal impact on the overall population in Southeast Alaska.

Northern Goshawk

Harvesting old-growth timber could reduce the quality and availability of nesting habitat for northern goshawk in the Northwest Baranof Project Area. Types of impacts from timber harvesting could include reduced foraging habitat quality, reduced prey densities, and increased competition from red-tailed hawks and other raptors (Crocker-Bedford 1990). These effects could potentially result in reduced population levels and reduced nesting success of northern goshawks (Crocker-Bedford 1990).

Northern goshawks are known to occur in the Northwest Baranof Project Area. Forest Service crews located one goshawk nest and one probable nest site during goshawk surveys. No harvest units were planned within 2 miles of either nest site in any of the alternatives. Management of goshawk nest sites and habitat in the Alaska Region is currently being studied by the Forest Service. Future management of goshawk nest sites and habitat in the Project Area will be guided by the direction that is developed for goshawk management for the Alaska Region.

Any pairs of northern goshawks not discovered prior to timber harvest may be affected if the harvest unit corresponds to goshawk nesting habitat. In addition, old-growth forest throughout the Project Area provides potential nesting habitat for future goshawk nesting activities. Therefore, the Northwest Baranof Project could affect northern goshawks and potential habitat for goshawks.

Kittlitz's Murrelet

During breeding season Kittlitz use inshore marine water and adjacent mountains and sea cliffs. Little is known about the nesting habits, but one egg is usually laid on bar rock above timberline and/or on unvegetated glacial moraines and on grassy ledges of island sea cliffs. If Kittlitz's nest in the Northwest Baranof Project Area are expected to nest in alpine habitats. There is not activity planned in alpine/subalpine habitat. Therefore, no impacts are expected to Kittlitz's murrelet habitats from proposed actions.

Harlequin Duck

The harlequin duck will not be affected by timber harvesting activities in the Northwest Baranof Project Area. The TTRA prohibits timber harvest within 100 feet of river and stream channels, thereby protecting potential nesting habitat for harlequin ducks. Wintering habitat also will not be affected because no proposed activities would occur in wintering habitat areas.

Olive-sided Flycatcher

In Southeast Alaska, the olive-sided flycatcher occurs primarily in second-growth forest and alder habitats, and occasionally in muskegs. Loss of habitat would occur only from construction of roads through these habitat types. Only 1 percent or less of the existing second growth and muskeg habitat, and less than 1 percent of the existing riparian habitat in the Project Area would be affected by proposed harvest units and roads (Hartmann 1995). Riparian habitat is used as an indicator of alder habitats. Alder occur in disturbed sites including riparian and landslide areas. No units are proposed in landslide areas. Therefore, impacts to the olive-sided flycatcher resulting from loss of habitat are expected to be minor.

Fish

No threatened or endangered fish species are known to occur in the Northwest Baranof Project Area, therefore, no affects are expected.

Plants

No threatened or endangered plant species occur in the Northwest Baranof Project Area. No sensitive plants were found during field surveys and none are expected to be affected by the proposed actions.

On-site Human Environment

Silviculture and Timber Management

Harvest by Volume Class

Tables 4-20 and through 4-21 display the distribution of acres proposed for harvest in each action alternative for Volume Class 4 and 5. Only those VCUs in which actions are proposed in each alternative are displayed in the tables. Because Alternative 5 proposes no timber harvest with this Project, it is not displayed.

Table 4-20
Proposed Harvest of Volume Class 4 Timber (in Acres and by Alternative)

VCU	Alt. 1	Alt. 2	Alt. 3	Alt. 4
287	19	0	19	19
288	241	0	250	250
289	0	87	87	87
290	0	0	0	0
291	45	116	114	116
292	226	507	487	525
299	65	0	0	65
300	258	139	0	313
301	89	130	0	130
302	174	299	0	299
Total	1,117	1,278	957	1,804

Table 4-21
Proposed Harvest of Volume Class 5 Timber (in Acres and by Alternative)

VCU	Alt. 1	Alt. 2	Alt. 3	Alt. 4
287	49	0	49	49
288	59	0	59	59
289	0	0	0	0
290	0	0	0	0
291	175	326	322	326
292	100	608	494	642
299	25	0	0	25
300	55	0	0	55
301	53	102	0	102
302	92	183	0	183
Total	608	1,219	924	1,441

Eight acres of harvest are proposed in Volume Class 6 (four acres in Unit 1171, VCU 291; and four acres in Unit 3201, VCU 292). These eight acres are proposed in Alternatives 2, 3, and 4. No Volume Class 7 timber is proposed for harvest.

Logging Systems

Yarding is the process of conveying logs from the stump to a landing. This can be done with ground-based equipment, cable logging systems, or helicopters. The method used depends upon many factors including access, topography, slope, and resource protection needs.

The moist, soft soils and steep slopes in the Northwest Baranof Project Area are difficult for operation of ground-based equipment (e.g., track or rubber-tired skidders), and except for shovel logging with track-mounted log loaders, there has been little opportunity for use of this type of equipment. Shovel logging is the process of moving logs with the boom of a hydraulic log loader. Shovel yarding is generally limited to slopes of less than 20 percent. Portions of proposed harvest units that are proposed for cable yarding may be suited for shovel yarding.

Cable logging systems used include highlead, slackline, and skyline systems. Highlead, slackline, and running skyline systems can be used to yard logs both up and down hill. Live skyline (flyer) systems are used for uphill yarding only. No highlead yarding is planned under any of the alternatives. Slackline and skyline systems are capable of lifting one end of the log, or completely suspending the log. The impact of log movement with these systems is much reduced when compared to highlead. Convergence or divergence of drag corridors is similar with the slackline and skyline systems. The more economical

running skyline systems can be used for both uphill and downhill yarding situations where the average yarding distance is 500 feet or less.

Helicopter yarding has been established as a viable alternative yarding system on the Chatham Area. Logs are lifted off the ground and flown to landings. This yarding system causes the least amount of impact to the soil and minimizes road construction, but has the highest yarding cost.

All of the above systems are capable of clearcut harvest, provided harvest unit design and resource protection requirements are not limiting factors. However, for partial removal of the standing timber in a harvest unit with the objective of retaining regeneration, individual trees, or groups of trees, running skyline, live skyline, or helicopter systems are preferred. These systems afford the necessary lift and control of the logs during yarding to prevent damage to residual trees.

Table 4-22 shows a comparison of proposed harvest system acreages for the action alternatives. Alternative 5 is not included, since it proposes no harvest for this project.

Table 4-22
Comparison of Proposed Harvest Systems by Alternative

	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Skyline	885	51	862	34	590	31	1,196	37
Helicopter	840	49	1,643	66	1,299	69	2,067	63
Total	1,725	100	2,505	100	1,889	100	3,263	100

The distribution of proposed harvest systems varies for the action alternatives. Skyline systems (slackline, running skyline, and live skyline) are proposed for 31 to 51 percent of the harvest acres; Alternative 3 proposes the least and Alternative 4 proposes the most acres for skyline yarding. In the general skyline category, live skyline is the dominant yarding method for all action alternatives. In a few units, the slackline system is proposed, and minor acreages throughout the units will meet the requirements to employ running skyline systems. Helicopter yarding is proposed for 49 percent to 69 percent of harvest acres.

4 Environmental Consequences

Proportion of Volume Classes 6 and 7 Proposed for Harvest

The Tongass Timber Reform Act of 1990 (TTRA) modified the APC and KPC long-term timber sale contracts to:

> Eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in Volume Classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous management area does not exceed the proportion of volume currently represented by these classes within the management area.

USDA FSH 2409.18 Region 10 Supplement No. 2409.18-92-5, contains the procedure we currently follow in determining the proportionality requirements of the TTRA. This procedure has been successfully challenged in court (Wildlife Society et. al. vs. Barton, J93-001 CIV). Alternative methods are being evaluated but are not available at this time.

The objective of the proportionality requirement is to ensure that for each TLMP Management Area (MA), the proportion of old-growth Volume Classes 6 and 7, as compared to the total old-growth in the timber base, is the same after the long-term contract expires as it was when the TTRA was enacted, November 28, 1990. Volume Classes 6 and 7, as defined in the TLMP, refers to volume strata with net inventory volume averaging more than 30,000 board feet per acre.

Although the long-term contract with Alaska Pulp Corporation (APC) was terminated by the Forest Service in 1994, the long-term contract with Ketchikan Pulp Corporation (KPC) remains in effect. Since all or portions of the alternatives may now be offered to KPC under the terms of that long-term contract, the requirements for analysis and disclosure of proportionality under TTRA are still in effect as well.

The basis for proportionality analysis is the updated timber type map (TIMTYP) in the Forest Geographic Information System (GIS). TIMTYP is the timber resource base used for the TLMP revision, and has been updated for harvest through November 28, 1990. This is the date the TTRA was signed into law, and is the basis for calculating proportionality. All wilderness, TTRA designated LUD II areas, and Class I and applicable Class II stream buffer zones have been excluded from the updated TIMTYP base for assessment of proportionality. Timber harvest areas that are planned or harvested can be entered into GIS and combined with the updated TIMTYP layer to electronically calculate proportionality. However, the proportionality requirement of TTRA is specific to volume harvested, not volume planned or scheduled for harvest. The final determination of proportionality will be made based on the actual location of the designated harvest units.

Tables 4-23 and 4-24 display the proportionality for Management Areas C40 and C41 (described in Chapter 1 of this EIS), using existing FSH direction, for the action alternatives. Since Alternative 5 proposes no timber harvest, it is represented by the current land base acres and proportionality. Each table shows the land base distribution of volume classes and proportionality as of November 28, 1990, and harvest projections based on the GIS TIMTYP layer.

Table 4-23
TTRA Proportionality for Management Area C40

	Total Timber Base (acres)	Volume Classes 4 and 5 (acres)	Volume Classes 6 and 7 (acres)	Proportionality (percent)
Current Land Base (Alternative 5 - No Action)	52,331	51,867	464	.89
Proposed for Harvest - Alternative 1	-1,203	-1,203	---	
Projected Proportionality	51,118	50,654	464	.91
Proposed for Harvest - Alternative 2	-974	974	---	
Projected Proportionality	51,357	50,893	464	.90
Proposed for Harvest - Alternative 3	-498	-498	---	
Projected Proportionality	51,833	51,369	464	.90
Proposed for Harvest - Alternative 4	-1,670	-1,670	---	
Projected Proportionality	50,661	50,197	464	.92

Table 4-24
TTRA Proportionality for Management Area C41

	Total Timber Base (acres)	Volume Classes 4 and 5 (acres)	Volume Classes 6 and 7 (acres)	Proportionality (percent)
Current Land Base (Alternative 5 - No Action)	27,653	26,945	708	2.56
Proposed for Harvest - Alternative 1	-522	-522	---	
Projected Proportionality	27,131	26,423	708	2.61
Proposed for Harvest - Alternative 2	-1,531	-1,523	-8	
Projected Proportionality	26,122	25,422	700	2.68
Proposed for Harvest - Alternative 3	-1,391	-1,383	-8	
Projected Proportionality	26,262	25,562	700	2.67
Proposed for Harvest - Alternative 4	-1,593	-1,585	-8	
Projected Proportionality	26,060	25,360	700	2.69

Source: Mork 1995

4 Environmental Consequences

Long-term Productivity

The effects of all action alternatives on long-term timber productivity would be the conversion of unmanaged, old-growth stands to managed, faster growing, second-growth stands. Old-growth stands have lower forest floor temperatures than second-growth stands; thus reducing biological activity. Organic decomposition slows, and as a result, the supply of available nutrients is reduced. With decreased biological activity, less nitrogen is available for tree growth and the trees nutritional status is lowered. While growth and vigor of old-growth stands remain nearly constant, they are at a level below that of second-growth stands (Harris and Farr 1974).

All stands proposed for harvest are well beyond the age of maximum average annual growth of the stand. They are representative of uneven-aged western hemlock stands that commonly take hundreds of years to develop under natural conditions (that is, unless they are changed by natural events such as windthrow or manipulated by intensive forest management practices).

The open conditions created in clearcuts allow both Sitka spruce and western hemlock to regenerate rapidly. Even-aged stands are generally comprised of 10 to 75 percent spruce, depending on the soil type and the age of the stand. The volume of spruce in even-aged stands 75 to 100 years after harvest averages about 50 percent (Taylor 1934), compared to 28 percent in existing mature and overmature stands. With the use of silvicultural practices such as precommercial thinning, an additional 10 percent or more increase in the spruce component is expected.

Although log quality in second-growth stands is expected to be lower than in mature and over-mature stands, even on sites that have been precommercially thinned, total yield per acre is expected to be higher in second-growth stands. The lower quality will be reflected in the log grades (sizes), with second-growth timber stands having fewer high grade logs than existing mature and over-mature stands. In addition, second-growth stands will have less volume in the larger diameter classes. Nevertheless, total yield will be significantly greater in second-growth stands than in mature and overmature stands. The long-term result of precommercial thinning is the production of more usable fiber. Precommercial thinning also allows the option of reducing the rotation age. This is because merchantable size logs are produced sooner on thinned sites than in areas not thinned.

Most second-growth stands will exhibit less variation in tree diameter and height than the mature and overmature stands they replace. At 100 years of age, average diameters for unmanaged second-growth stands will range from 10 inches on medium sites to 14 inches on high sites (Forest Service 1991).

Cumulative Effects

As stated at the beginning of this chapter, we do not know yet if there will be any further harvest in the Project Area in the foreseeable future. That will be determined as result of the landscape analysis for the West Baranof and Kruzof Analysis Area that was initiated this year. Consequently, at this time, no future harvest is projected in the Project Area for the cumulative effects analysis period (through year 2008). So for this cumulative effects

analysis, we considered only those effects from this project in its alternative forms, and the cumulative effects from previous timber harvesting and associated activities. Table 4-25 displays cumulative effects by alternative for the Project Area.

Table 4-25
Cumulative Acres Harvested by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Previous Harvest Acres	12,286	12,286	12,286	12,286	12,286
Proposed Harvest Acres	1,725	2,505	1,889	3,263	0
Total Harvest Acres	14,021	14,791	14,175	15,549	12,286

The greatest difference in cumulative effects from harvest is between Alternative 4, with the highest level of proposed timber harvest, and Alternative 5, which defers all timber harvest. It is worth noting that if Alternative 5 (no action) were implemented, harvest would be deferred, at this time, however there would be a future timber harvest planned before the year 2008. However, since the remaining land available for harvest closely confines the present alternatives, any deferred entry would be substantially the same as those presently being analyzed, differing only in time of entry. This would result in a slightly different spatial and temporal pattern of stands over the harvested areas, but with essentially the same composition on a landscape basis.

Overall, the alternatives propose from 6 to 8 percent of the total land base; from 18 to 23 percent of the total commercial forest land; and from 26 to 33 percent of the total tentatively suitable land in the Project Area. Thus, the cumulative effects of each alternative on the timber resource in the Project Area can be considered nearly the same. Tables 4-26 through 4-30 display the cumulative effects by Alternative and by VCU.

Table 4-26
Alternative 1 - Acres of Forested Land Harvested (by VCU)

VCU	Past Harvest	Proposed Harvest	Total Harvest	Percent Cumulative Harvest		
				Tentatively Suitable	CFL	Land Area
287	1,669	68	1,737	15%	11%	4%
288	0	300	300	15%	13%	4%
289	279	0	279	13%	8%	3%
290	149	0	149	13%	9%	3%
291	1,935	220	2,155	42%	29%	18%
292	3,975	326	4,301	61%	37%	18%
299	1,712	90	1,802	91%	57%	8%
300	1,091	313	1,404	29%	22%	11%
301	787	142	929	43%	28%	16%
302	689	266	955	17%	13%	7%
Total	12,286	1,725	14,011	30%	20%	7%

Table 4-27
Alternative 2 - Acres of Forested Land Harvested (by VCU)

VCU	Past Harvest	Proposed Harvest	Total Harvest	Percent Cumulative Harvest		
				Tentatively Suitable	CFL	Land Area
287	1,669	0	1,669	15%	11%	4%
289	279	87	366	17%	11%	4%
290	149	0	149	13%	9%	3%
291	1,935	445	2,380	46%	32%	20%
292	3,975	11,20	5,095	72%	44%	21%
299	1,712	0	1,712	87%	54%	7%
300	1,091	139	1,230	26%	20%	10%
301	787	232	1,019	48%	31%	18%
302	689	482	1,171	21%	16%	8%
Total	12,286	2,505	14,791	31%	21%	8%

Table 4-28
Alternative 3 - Acres of Forested Land Harvested (by VCU)

VCU	Past Harvest	Proposed Harvest	Total Harvest	Percent Cumulative Harvest		
				Tentatively Suitable	CFL	Land Area
287	1,669	68	1,737	15%	11%	4%
288	0	309	309	15%	14%	4%
289	279	87	366	17%	11%	4%
290	149	0	149	13%	9%	3%
291	1,935	439	2,374	46%	32%	20%
292	3,975	986	4,961	70%	42%	21%
299	1,712	0	1,712	87%	54%	7%
300	1,091	0	1,091	23%	17%	9%
301	787	0	787	37%	24%	14%
302	689	0	689	12%	10%	5%
Total	12,286	1889	14,175	30%	21%	7%

Table 4-29
Alternative 4 - Acres of Forested Land Harvested (by VCU)

VCU	Past Harvest	Proposed Harvest	Total Harvest	Percent Cumulative Harvest		
				Tentatively Suitable	CFL	Land Area
287	1,669	68	1,737	15%	11%	4%
288	0	309	309	15%	14%	4%
289	279	87	366	17%	11%	4%
290	149	0	149	13%	9%	3%
291	1,935	445	2,380	46%	32%	20%
292	3,975	1,182	5,157	73%	44%	21%
299	1,712	90	1,802	91%	57%	8%
300	10,91	368	1,459	30%	23%	11%
301	787	232	1,019	48%	31%	18%
302	689	482	1,171	21%	16%	8%

Total	12,286	3,263	15,549	33%	23%	8%

Table 4-30
Alternative 5 (No Action) - Acres of Forested Land Harvested (by VCU)

VCU	Past Harvest	Proposed Harvest	Total Harvest	Percent Cumulative Harvest		
				Tentatively Suitable	CFL	Land Area
287	1,669	0	1,669	15%	11%	4%
289	279	0	279	13%	8%	3%
290	149	0	149	13%	9%	3%
291	1,935	0	1,935	38%	26%	16%
292	3,975	0	3,975	56%	34%	17%
299	1,712	0	1,712	87%	54%	7%
300	1,091	0	1,091	23%	23%	9%
301	787	0	787	37%	24%	14%
302	689	0	689	12%	10%	5%
Total	12,286	0	12,286	26%	18%	6%

Hunting, Fishing, and Subsistence

Hunting

The availability of wildlife for hunters and trappers could be affected by the proposed action in the following ways: (1) reduced habitat capability could decrease availability over time; (2) new roads could increase competition for wildlife through improved access; and (3) the presence of resident logging camps could temporarily increase demand for wildlife. Future hunter demand could further impact the availability of wildlife. The principal species sensitive to management activities and over harvesting are Sitka black-tailed deer, brown bear, marten, and mountain goat.

It is important to remember that the habitat capability models developed to measure only the effects of clearcutting. Overstory removal and group selection as proposed in the Northwest Baranof Project are not accurately represented. Furthermore, these models were designed to measure and compare effects of the proposed alternatives, and are not reliable for comparison to actual harvest levels or populations needed to support harvest. As a result, the comparisons we make in this chapter to actuala harvest or population estimates are not accurate. They are used solely as an indicator of a situation that will require further analysis and monitoring.

Habitat capabilities for Wildlife Analysis Areas (WAAs) were compared to average harvest levels reported by ADF&G to determine if existing or resulting habitat capabilities are adequate to meet hunter demand. This comparison is shown in Tables 4-31 through 4-34.

Table 4-31
Average Harvest of Sitka Black-tailed Deer and Population Needed to Support Harvest Compared to Estimated Habitat Capability by Alternative

WAA*	Average Deer Harvest 1987-93	Population Needed to Support Harvest	Habitat Capability by Alternative				
			Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
3001	699	6,990	3,769	3,767	3,790	3,759	3,790
3312	129	1,290	473	478	472	472	479
3313	136	1,360	1,739	1,709	1,713	1,707	1,753
3314	132	1,320	946	948	946	946	948
Total	1,096	10,960	6,927	6,902	6,921	6,884	6,970

Source: Hartmann 1995. Note: Population needed to support harvest assumes a 10 percent harvest of the population.
* Includes portions of WAA outside the Project Area.

Habitat capability for Sitka black-tailed deer does not appear sufficient to support a population capable of sustaining the average level of harvest from 1987 to 1993 under any of the alternatives, including Alternative 5 (no-action alternative). Projected habitat capabilities are less than the population needed to support harvest for all WAAs except WAA 3313. Habitat capabilities even before 1954 (prior to timber harvesting under the APC Long-term Timber Sale Contract) were not sufficient to support the average harvest in WAAs 3001, 3002, 3312, and 3314. The sustainable harvest level is estimated to be 10 percent of the deer population (Flynn and Suring 1989). Current harvest levels range from 8 percent of the habitat capability (WAA 3313) to 45 percent of the habitat capability for WAA 3002 (14 percent for WAA 3314, 27 percent for WAA 3312, and 18 percent for WAA 3001). All action alternatives would increase this disparity. Alternative 4 has the greatest impact on habitat capability followed by Alternative 2 and Alternative 1 and 3. Alternative 3 is the only alternative with no proposed timber harvest in WAA 3001 the Project Area WAA with the highest deer harvest.

Brown Bear

The Northwest Baranof Project Area is within GMU 4. Rural residents within GMU-4 and the residents of Kake are allowed to harvest brown bear for subsistence purposes. Others may harvest brown bear under State regulations. Federal subsistence regulations require that a person taking brown bear for subsistence uses in Southeast Alaska salvage both the hide and the edible meat of a brown bear. Brown bear are generally not considered a food source but limited use is made of parts of the bear for cultural purposes. Most of the brown bear taken in the Project Area are considered sport harvest (ADF&G harvest data).

Table 4-32
Average Harvest of Brown Bear and Population Needed to Support Harvest Compared to Estimated Habitat Capability by Alternative

WAA*	Average Bear Harvest 1987-93	Population Needed to Support Harvest	Habitat Capability by Alternative				
			Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
3001	2	50	94	94	95	94	95
3312	1	25	27	27	27	27	27
3313	3	75	92	92	92	91	92
3314	1	25	51	51	51	51	51
Total	7	175	264	264	265	263	265

SOURCE: Hartmann 1995. Note: Population needed to support harvest assumes a 4 percent harvest of the population.
* Includes portions of WAA outside the Project Area.

An average of 9 brown bears, or approximately 2.5 percent of the existing habitat capability, was harvested per year between 1980 and 1993. The sustainable harvest level for brown bears is variable depending on the suitability of habitat conditions, but is generally considered to be 4 percent.

Table 4-32 indicates that brown bear abundance under all alternatives will be sufficient to sustain the 1980 to 1993 average harvest in Project Area WAAs.

Mountain Goat

According to the habitat capability model, habitat capability for mountain goat does not appear to be sufficient to support a population capable of sustaining the average harvest level from 1976 to 1993 under any of the alternatives. However, in a September 1994 goat survey Jim Faro (ADF&G Wildlife Conservation Division) counted approximately 370 goats in Project Area WAAs (Schenck 1995). Not all of the Project Area was included in this serial survey. Goat surveys conducted in recent years indicate that the Baranof herd is expanding. Based on recent goat counts and an expanding herd, it appears that the model is under-representing the current population and the actual population is well above what the habitat capability models would predict. Jim Faro (personal communication) feels that 7 to 10 percent of the goat population could be harvested for conservative management, and this level of harvest would maintain goat population levels and allow for continued growth. There will be no measurable change in alpine/subalpine habitats (habitats important to goats) by the proposed actions. However, goat habitat capability will be reduced by 0 to 3 percent depending on the alternative. Even with this reduction in habitat capability, the actual population will support the current harvest. However, measures may need to be taken to restrict access on constructed or reconstructed roads, especially in VCU 300.

Table 4-33
Average Harvest of Mountain Goat and Population Needed to Support Harvest Compared to Estimated Habitat Capability by Alternative

WAA*	Average Goat Harvest 1987-93	Population Needed to Support Harvest	Habitat Capability by Alternative				
			Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
3001	13	186	50	49	51	49	51
3312	<1	14	0	0	0	0	0
3313	1	14	23	23	23	23	23
3314	2	28	7	7	7	7	7
Total	17	242	80	79	81	79	81

Source: Hartmann 1995. Note: Population needed to support harvest assumes a 7 percent harvest of the population.
* Includes portions of WAA outside the Project Area.

Marten

Marten are presently being trapped in the Project Area. Approximately 1 percent of the trappers that reported harvest in the Project Area are from communities other than Sitka.

Changes in local marten distribution are expected when second growth in harvested units reaches 25 years old. Timber harvest and regrowth of second growth in harvest units alter marten habitat-use patterns.

Table 4-34 indicates that marten habitat capability under all alternatives will be sufficient to sustain the 1984 to 1993 average harvest of 29 marten. In fact, there would be habitat capable of supporting a harvest of at least 193 marten with any of the alternatives.

Table 4-34
Average Harvest of Marten and Population Needed to Support Harvest Compared to Estimated Habitat Capability by Alternative

WAA*	Average Marten Harvest 1987-93	Population Needed to Support Harvest	Habitat Capability by Alternative				
			Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
3001	29	74	171	170	173	170	173
3312	16	40	36	37	36	36	37
3313	29	73	134	131	131	130	136
3314	10	25	70	70	70	70	70
Total	84	212	488	485	487	483	493

Source: Hartmann 1995. Note: Population needed to support harvest assumes a 40 percent harvest of the population.
* Includes portions of WAA outside the Project Area.

Waterfowl

A variety of waterfowl use the fresh and saltwater habitats in the Project Area. Timber harvest unit locations generally avoid important waterfowl areas. The estuary grass flats, beach fringe, and borders of inland lakes and streams would remain largely unaffected. Less than 1 percent of the beach fringe, estuary fringe, and riparian habitat will be impacted by proposed rods and units..

Marine Mammals

Federal law prohibits the taking of marine mammals by anyone other than Native hunters. There is no evidence that timber harvest activities have had any effects on marine mammals taken for subsistence or their habitat. There are no foreseeable impacts from the proposed actions on marine mammals.

Salmon

Salmon are a major subsistence food harvested in the Northwest Baranof Project Area. The Fisheries section of this chapter concludes that with the application of best management practices and TTRA buffer strips, no quantifiable effects are expected on salmon and trout spawning and rearing habitat. All salmon spawning and rearing streams (Class I and Class II streams) near proposed timber harvest units are protected by buffers of at least 100 feet as prescribed in the TTRA. In addition, specific prescriptions for protecting salmon habitat are incorporated if needed during the layout of harvest units and roads (see Appendix G, Unit Cards; and Appendix H, Road Cards).

Based on the implementation of site-specific prescriptions developed during interdisciplinary meetings for protecting salmon spawning and rearing habitat, the EIS projects that the immediate and foreseeable effects on the abundance and distribution of salmon for subsistence uses in the Project Area would not be measurable.

Other Finfish

The action alternatives for the proposed project would have no immediate or foreseeable effect on other finfish habitat. Because there would be no effect on other finfish habitat, the abundance and distribution of other finfish would not be affected.

Shellfish

Based on the limited impact the proposed LTF sites have on marine and estuarine habitat, crabs, and benthic organisms, the effect on the abundance and distribution of local crabs, clams, and other shellfish would not be measurable for purposes of subsistence. The project effects for the foreseeable future would not be measurable.
The Project Area is not the only area available for big game hunting and not the primary area used for any of the guides holding permits to hunt in the area. Of the specific locations reported to be used for big game hunting, only one, Fish Bay, lies completely within the Project Area. No harvest is proposed for this location under any of the alternatives. Under these conditions, we assume there would be only minimal impact to the outfitter/guide industry under any of the management alternatives considered.

Fishing

People fish throughout the Project Area. In general, the large streams at the heads of bays, and one lake receive most of the recreational pressure. Steelhead trout are the species most susceptible to fishing pressure in the Project Area. Current sport fishing regulations allow one steelhead (minimum 36 inches) per day bag limit, and two fish annually.

The establishment of logging camps at Noxon Creek and Schulze Cove may increase fishing pressure at Nakwasina River and Fish Creek, respectively during camp operations (three to five yeras). No roads are proposed in any alternative along Nakwasina River and Fish Creek. The conservative steelhead management strategy, coupled with the small scale and short duration of camp occupancy, minimize the effects of sport fishing under each alternative.

4 Environmental Consequences

Subsistence

Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) requires a Federal agency having jurisdiction over lands in Alaska to evaluate the potential effects of proposed land-use activities on subsistence uses and needs. Section 810 of ANILCA states:

In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the agency having primary disposition over such lands or his designee shall evaluate the effects of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such federal agency:

- gives notice to the appropriate state agency and appropriate local committees and regional councils established pursuant to ANILCA Section 805;
- gives notice of and holds a hearing in the vicinity of the area involved; and
- determines that: such a significant restriction of subsistence uses is necessary, and consistent with sound management principles for the utilization of the public lands; the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition; and reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such action.

We evaluated the effects of the proposed alternatives using these criteria:

- changes in abundance or distribution of subsistence resources,
- changes in access to subsistence resources, and
- changes in competition from nonsubsistence users for those resources.

Our evaluation determines whether subsistence uses in the Project Area or portions of the Project Area may be significantly restricted by any of the proposed action alternatives. This evaluation considers the availability of subsistence resources in the surrounding areas, the cumulative impacts of past and foreseeable future activities on subsistence users and resources, and the potential cultural and socioeconomic implications affecting subsistence users. The evaluation also focuses on the mapped subsistence use areas in the Project Area. The evaluation relies heavily upon wildlife habitat capability models as well as ADF&G hunter survey data. Additional information about the subsistence evaluation is included in Appendix I.

A proposed action shall be considered to significantly restrict subsistence uses if after any modification warranted by consideration of alternatives, conditions, or stipulations, it can be expected to result in a substantial reduction in the opportunity to continue subsistence uses of renewable resources. Reductions in the opportunity to continue subsistence uses generally are caused by reductions in abundance of or major redistribution of resources, substantial interference with access, or major increases in the use of those resources by

non-rural residents. The responsible official must be sensitive to localized, individual restrictions created by any action and make his decision after a reasonable analysis of the information available.

Significant restrictions are differentiated from insignificant restrictions by assessing whether the action undertaken shall have no or slight effect as opposed to large or substantial effects. In further explanation the Bureau of Land Management (BLM) Director states that no significant restriction results when there would be "no or slight" reduction in the abundance of harvestable resources and no occasional redistribution of these resources. There would be no effect (slight inconvenience) on the ability of harvesters to reach and use an active subsistence harvesting site, and there would be no substantial increase in competition for harvestable resources (that is, no substantial increase in hunting by non-rural residents).

Conversely, restrictions for subsistence uses would be significant if there were large reductions in abundance or major redistribution of these resources, substantial interference with harvestable access to active subsistence-use sites or major increases in non-rural resident hunting. In light of this definition, the finding of significant restriction must be made on a reasonable basis, since it must be decided in light of the total subsistence lands and resources that are available to individuals in surrounding areas living a subsistence lifestyle. The Draft EIS evaluates the availability of subsistence resources in surrounding areas that could be accessed without undue risk or economic hardship to subsistence users.

Sitka Black-tailed Deer

Deer are an important subsistence resource used by residents of the rural communities near the Northwest Baranof Project Area. Average subsistence deer harvest in WAAs 3001, 3002, 3312, and 3314 exceed 10 percent of the existing habitat capability indicating that demand for deer exceeds supply. The estimated number of deer available for harvest is sufficient to meet current subsistence and non-subsistence demands only in WAA 3313, but will not meet the projected increasing demand from subsistence and sport hunters.

Determining what harvest levels are sustainable assumes that habitat capability projections from the deer harvest model reflect an approximation of deer population. Furthermore, it is based on the recommendation by ADF&G that a harvest rate of 10 percent should be used in land-use and population management planning in Southeast Alaska (Flynn and Suring 1989).

Table 4-35 shows the mean deer harvest for 1987 through 1992 for Project Area WAAs by rural and nonrural communities and shows percent of the WAAs harvested by rural and nonrural communities. It is assumed that the 1987 to 1992 mean deer harvest reflects rural and nonrural community use of deer in Project Area WAAs. ADF&G has only collected deer harvest data for individual WAAs since 1987. Averaging the deer harvest makes allowance for factors which influence deer numbers and hunting activity from year to year, such as weather patterns, access, habitat capability, and hunting success. Overall, nonrural residents harvest an average of only 5 percent of the deer from the Project Area.

Table 4-35
Mean Deer Harvest for 1987 through 1992 for Project Area WAAs by Rural and Non-rural Communities

WAA	Deer Harvested		Total	Percent Harvested	
	Rural	Nonrural		Rural	Nonrural
3001	509	18	527	97%	3%
3312	139	2	141	99%	1%
3313	123	16	139	88%	12%
3314	116	13	129	90%	10%
Total	887	49	936	95%	5%

Source: Hartmann 1995. Derived from ADF&G Deer Harvest Data for Southeast Alaska, Thornton 1987-1992.

Current subsistence demand exceeds the estimated deer supply in WAAs 3001, 3002, 3312 and 3314. WAA 3313 shows that with increasing demand and slightly reduced deer habitat capability (from the worst case alternative) that both projected subsistence and non-subsistence demand will not be met in the year 2008 (see Appendix I).

Overall for all Project Area WAAs the current habitat capability (supply) is 25 percent less than the total average deer harvest for years 1987-1992 from both rural and nonrural communities and 21 percent less than the harvest from rural communities.

Table 4-36
Deer Population Needed to Support Current Average Harvest to Meet Demand from Rural and Nonrural Communities

WAA	Rural	Nonrural	Total	Habitat Capability
3001	5,090	180	5270	3,790
3312	1,390	20	1,410	476
3313	1,230	160	1,390	1,753
3314	1,160	130	1,290	948
Total	8,870	490	9,360	6,970

Source: Hartmann, 1992 Derived from ADF&G Deer Harvest Data for SE Alaska 1987 - 1992 and Chatham Area GIS.

The potential site-specific effects on deer habitat capability (deer habitat capability reflects potential deer abundance) are evaluated in the Wildlife section (page 4-18). Past activities have reduced deer habitat capability in all Project Area WAAs 8 to 25 percent.

The habitat capability model projects a 1 to 2 percent reduction in deer numbers may be expected from the proposed timber harvest alternatives. This potential reduction represents a range of 43 to 86 deer over the Project Area. The cumulative reductions in habitat capability from past and currently proposed actions range from 17 percent in the no action alternative to 19 percent in Alternative 4.

The resulting ranking, from lowest impact to highest impact by alternative is: 5, 1, 3, 2, and 4. Residents of Sitka harvest 90 percent of the deer that are taken from the Project Area. Sixteen other communities harvest the other ten percent of the deer harvest. The area Sitka residents use the most is the area closest to Sitka, including Nakwasina Passage, Neva Strait, and St. John Baptist Bay. Alternative 3 avoids these areas completely. Alternative 2 has no harvest proposed for VCU 299 and 300, both in Nakwasina Passage. Alternative 4 proposed the most harvest for this area followed by Alternative 1.

Based on the effect of one or more of the project alternatives on the estimated number of deer available for harvest by Sitka residents, there is a significant possibility of a significant restriction of subsistence use of deer for Sitka residents. It may be possible to minimize this restriction by regulating nonsubsistence uses of areas most heavily used by Sitka residents for deer hunting.

Summary of Findings for Subsistence Use of Deer
Each of the alternatives may have a significant possibility of a significant restriction of subsistence use of Sitka black-tailed deer by the residents of Sitka.

Table 4-37
Significant Possibility of a Significant Restriction on Subsistence Use of Sitka Black-tailed Deer

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
Abundance or Distribution	Yes	Yes	Yes	Yes	Yes
Access	No	No	No	No	No
Competition	No	No	No	No	No

Note: "No" indicates an insignificant possibility of a substantial effect. "Yes" indicates a significant possibility of a substantial effect. Source: Hartmann 1995.

Other Food Resources

Other foods include plants such as kelp, goose tongue, a variety of berries, etc. Most traditional other food gathering occurs near beach and estuarine areas. Timber harvest units and roads proposed in action alternatives may infringe upon beach areas potentially used for other food gathering if gathering extends beyond the 500-foot beach fringe buffer. Four proposed units would harvest a total of 2.6 acres of beach finge habitat (Unit 6341 in VCU 302; and Units 1145, 3291, and 3301 in VCU 292). Road construction

activities would improve access to berry picking sites that are now not reasonably accessible.

Since beach fringe and estuaries will not be significantly impacted by the proposed timber harvest and additional food gathering sites will be made available, the project effects and the foreseeable effects are not expected to substantially affect the abundance and distribution of other foods.

Firewood

The Forest Service has a free-use policy for firewood and timber and none of the proposed alternatives will have an adverse effect on the availability of firewood and personal-use timber. Construction of low-angle slides at the LTFs could make personal-use timber more available to individuals. The proposed LTFs for Rodman Bay, Schulze Cove, Nakwasina Passage, Noxon Creek, and Lisa Creek are all low-angle LTFs.

Access

Road construction would improve hunter and trapper access to the Project Area. Improved road access may result in greater hunter success for deer and bear, and potential over harvest of resident marten populations. Road access may also increase bear-human conflicts which could result in increased defense of life and property kills of bears. Since the Project Area roads will not be linked to any community the disturbance to wildlife would be greatest during road building and harvest activity. Off-road vehicles could easily be transported by boat to roads in the Project Area. Roads remaining open would have greater impacts on wildlife than roads closed to vehicular traffic, although closed roads could support some level of off-road vehicle and foot traffic for several years following logging. Thus, deer, brown bears, and marten could be affected by human disturbances under each of the action alternatives.

Access to historical subsistence-use areas may be affected where logging activities (such as LTFs and logging camps) are located in the beach fringe. This is because traditional subsistence access is by boat to the beaches of the Project Area. The effect on access would probably be minor under all alternatives because less than one percent of the beach fringe and estuary fringe habitat will be impacted by logging activities. Access to inland hunting sites will be improved by the building of new and reconstructed roads.

New and rebuilt roads will provide access to areas that were not previously used for subsistence harvesting resources (Alternative maps). Miles of road proposed for construction are shown in Table 4-44. Road access would favor harvest by logging camp residents and road construction crews who may have motorized vehicles available during the time camps are active. Off-road vehicles (ORVs) could be transported to the Project Area by boat and used for hunting and subsistence purposes. Residents from nearby communities, especially Sitka are expected to use the roads for hunting.

Road management objectives developed for Project Area roads will take subsistence uses into consideration. RMOs vary by alternative. Once selected, the RMO prescription can be changed if needed to better manage wildlife resources for subsistence users.

Competition

Competition for subsistence resources in the Northwest Baranof Project Area is an issue to residents of Sitka and possibly other subsistence users. Increased competition could occur from logging camp residents on subsistence resources. Some future residents of the logging camps would be subsistence users. It is possible, though, that some camp residents would be Alaska nonresidents and nonrural residents. Most nonrural and Alaska nonresidents are employed seasonally by the logging companies and may leave prior to peak hunting times in late October through December thus reducing their impact on subsistence resources.

The Federal Subsistence Board may use its authority to regulate nonrural harvest of deer and has authority to prioritize the harvest of deer among rural residents when necessary to protect the resource. This type of action, as prescribed by ANILCA, Section 804, may be necessary to ensure the availability of adequate abundance of deer needed by the rural communities using the Project Area whether or not the proposed actions are implemented. The current deer population level does not necessarily require restrictions on nonrural users. However, the Federal Subsistence Board did restrict hunting by nonrural hunters in GMU-4 (which includes the Project Area) in regulatory years 1991 and 1992.

Deer populations in the Project Area are likely to suffer increased mortality if and when there is a hard winter at low elevations. Winters where snow depths of over fifteen inches that persist longer than 30 days have occurred in 1950, 1956, 1969, 1972, 1982, 1989, and 1991 (Copenhagen 1989, Schenck 1995). In Juneau, the long-term record through 1980 showed that 9.1 percent of the time, there is over 10 inches of snow on the ground (Bowling and Slaughter 1983).

The combination of deep snow for a long period (over 30 days) can contribute to high winter deer mortality. Excessively high deer densities and overbrowsed range have also caused localized winter die-offs within the Project Area (Kirchoff, 1991). Based on the above, it appears that conditions which would lead to a reduction in deer abundance will occur between 10 and 17 percent of the time between now and 2008 (Johnson 1986, Juday 1982, Merriam 1970) .

The reductions in deer abundance may be followed by changes in subsistence hunting regulations. The changes in hunting regulations that have occurred have included a reduction in hunting season length, reductions in bag limits or both. As a response to the winter mortality in the Project Area during 1991, non-subsistence users were restricted from hunting, subsistence season length was reduced 30 days (15 percent) and bag limits were reduced by 2 (33 1/3 percent). Future season and bag limit changes to accommodate deer abundance will depend on the extent and duration of the winter weather. Additional factors that will be considered are the condition of remaining deer and the condition of the winter range following the high winter mortality.

Deer response to high winter mortalities can vary in Southeast Alaska. Sitka black-tailed deer have the capability to respond quickly to rebuild populations under ideal circumstances, but there are areas where high winter mortality has resulted in low

populations and no seasons for over 10 years (Thornton 1992). Within GMU 4, season length and bag limit restrictions have lasted from 1 to 3 years. Population responses to favorable weather conditions have resulted in season and bag limit increases as well.

Hunting effort and hunter success is often affected following periods of high deer mortality in addition to reduced seasons and bag limits (Thornton 1992). When local populations declined, fewer residents engaged in hunting, while distance traveled by hunters increased.

These because of the reduction in deer abundance and probable reductions in numbers of hunters, reduced seasons and bag limits, and increased travel distances, there is a potential for a significant effect for subsistence resource uses of deer within the Project Area.

There is no evidence to indicate that salmon, finfish, shellfish or other food resources availability to subsistence users would be affected by sport or nonrural harvest. Any increase in competition from nonrural residents and Alaska nonresidents would not be substantial because of the availability of resources in the immediate vicinity and in the surrounding areas.

Individual household use of specific areas may be displaced by some of the proposed actions. There is not sufficient information available nor would it be practical to evaluate displacement potential for individual households. The Project Area's remoteness makes it very unlikely that an individual household or even an entire community is highly dependent on specific geographic areas within the Project Area that may be impacted by proposed actions. Generally, there are sufficient lands available elsewhere within or outside the Project Area for subsistence gathering. Any displacement that may occur is likely to be to other areas within a household's or community's historical range. Furthermore, any displacement that may occur would likely be temporary until activities within the Project Area conclude in three to five years.

Cumulative Effects

The Northwest Baranof Draft EIS evaluates the cumulative effects on subsistence practices in the Project Area and other Forest Service lands associated with continued implementation of the TLMP. The evaluation of cumulative effects for subsistence resources determines whether or not future activities may restrict subsistence uses and identifies the rural communities that use the Project Area that would be most affected by a restriction.

Based on the proposed timber harvest in the Northwest Baranof Project Area alternatives approximately 1,725 to 3,245 additional acres will be harvested in the Project Area by 2008. The Wildlife section projects that this level of harvest would affect the habitat capability of several wildlife species. The changes in habitat capability could affect their abundance and distribution. Relative to habitat capability projected for 1954, by the year 2008, the potential deer habitat capability is projected to decrease cumulatively from 17up to 19 percent; the potential marten habitat capability is projected to decrease cumulatively by 19 to 23 percent; the potential brown bear habitat capability is projected

to decrease cumulatively from 11 to up to 13 percent; the potential otter habitat capability is projected to decrease cumulatively by up to 46 percent; the potential Vancouver Canada Goose habitat capability is projected to decrease cumulatively from 8 up to 12 percent. These potential decreases in abundance could increase competition for the species important for subsistence. However, the abundance of brown bear, marten, and Vancouver Canada Goose appear to be sufficient to meet subsistence needs in the Project Area. Fish, shellfish and other food resources should likewise be available to meet subsistence needs. Average subsistence deer harvest in WAAs 3001, 3002, 3312, 3313, and 3314 exceed 10 percent of the existing and 1954 habitat capability indicating that demand for deer exceeds supply. The estimated number of deer available for harvest is sufficient to meet current subsistence and non-subsistence demands only in WAA 3313, but will not meed the projected increasing demand from subsistence and sport hunters. Future reductions in habitat capability and corresponding deer populations resulting from timber harvest may exacerbate the potential conflict between subsistence harvest and non-subsistence harvest of deer in the Project Area. In addition, to be successful hunters may need to make changes from their past hunting techniques or location or time of hunt. These possibilities reinforce the conclusion that the subsistence use of deer in the Project Area may be significantly restricted.

Actions on other lands surrounding the Project Area could also affect the abundance or distribution, access to, and competition for the subsistence resources harvested by the rural communities using the Project Area. Table 4-38 displays the other timber sale projects in progress or being planned in the vicinity of the Northwest Baranof Project. Enough is known about foreseeable activities on other lands surrounding the Project Area to project that subsistence use of deer may be significantly restricted in the future. Subsistence use of salmon, other finfish, shellfish or other resources in the Project Area is not expected to be significantly restricted.

Table 4-38
Timber Sale Projects in the Vicinity

Project	Location	ROD Date
Kelp Bay	Baranof Island (northeast side)	1992
Ushk Bay	Chichagof Island (southwest side)	1994
Northwest Baranof	Baranof Island	1995
False Island Salvage Sale	Chichagof Island (southwest side), Peril Strait	1997
West Baranof/Kruzof	Baranof, Kruzof, and smaller adjacent islands	1999

Source: Forest Service 1995

Determinations

4 Environmental Consequences

Section 810 (a) (3) of ANILCA requires that when a significant restriction may occur, determinations must be made in regard to whether:

- Such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of public lands;
- The proposed activity will involve the minimum amount of public lands necessary to accomplish the purposes of such use and occupancy, or other disposition;
- Reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

Necessary, Consistent with Sound Management of Public Lands

The alternatives proposed in the Northwest Baranof Draft EIS have been examined to determine whether they are necessary, consistent with sound management of public lands. In this regard the National Forest Management Act of 1976, the ANILCA, the Alaska Regional Guide, the TLMP, the TLMP 1985-86 Amendment, the Alaska State Forest Practices Act, and the Alaska Coastal Zone Management Program have been considered.

The ANILCA placed an emphasis on the maintenance of subsistence resources and lifestyles. However, the Act also required the Forest Service to make available for harvest 4.5 billion board feet of timber per decade from the Tongass National Forest. The TTRA removed the 4.5 billion-board-foot requirement from ANILCA but directed the Forest Service to seek to meet market demand and the market demand for the planning cycle. The average timber harvest off of all lands in Southeast Alaska (federal, state, and private) from 1984 to 1994 was 758 mmbf (sawlog plus utility). The average timber harvest from the Tongass National Forest for FY 1988 to 1994 was 378 mmbf (sawlog plus utility) of timber (USDA Forest Service 1994).

As mentioned in Chapter 1 of this Draft EIS, indicators of market demand include: the price of bids for timber in the region remains high and there is a demonstrated mill capacity in the region to process the logs if the supply of timber is available. There is also a projected need for the timber volume being considered from this Project Area for the Forest Service to provide timber under contract to the existing dependent industry. To be responsive to market demand, the Forest Service attempts to provide an opportunity for the industry as a whole to accumulate a supply of purchased but unharvested timber (i.e., volume under contract) equal to about three years of timber consumption (Morse 1995). A sale target of 1,016.7 mmbf to 1,261.6 mmbf by the end of FY 1996 would provide for the continued operation of the independent mills while allowing them to accumulate volume under the contract as a buffer to market volatility (Morse 1995). Timber harvested from the Northwest Baranof Project Area could contribute to the projected timber demand from the Tongass.

The action alternatives presented here encompass four different approaches that would produce the resources that would best meet the needs of the public and help achieve multiple use management objectives in the TLMP. All of the alternatives involve some potential to impact subsistence uses. There is no alternative that will meet TLMP objectives and yet avoid a significant possibility of subsistence restrictions somewhere in

the Forest. Therefore, based on the analysis of the information presented in this document on the proposed alternatives, these actions are necessary and consistent with the sound management of public lands.

Amount of Public Land Necessary to Accomplish the Purpose of the Proposed Action

Much of the Tongass National Forest is used by one or more rural communities for subsistence purposes for deer hunting. The areas of most subsistence use are the areas adjacent to existing road systems, the beaches, and the areas in close proximity to communities. Within the Project Area, the extent and location of the subsistence use area precludes complete avoidance. Areas other than subsistence use areas that could be harvested may be limited by other resource concerns such as: soil and water protection; high value wildlife habitat; economics; visuals; or unit and road design. Effort was taken to protect the highest value subsistence areas. For example, beach fringe is one of the highest use subsistence areas and less than one percent of the beach fringe habitat will be impacted by proposed roads and units.

The impact of viable timber harvest projects always includes alteration of old-growth habitat which in turn always reduces projected habitat capability for old-growth-dependent subsistence species. It is not possible to lessen harvest in one area and concentrate it in another without impacting one or more rural communities' important subsistence use areas. In addition, harvestable populations of game species could not be maintained in a natural distribution across the Forest if harvest were concentrated in specific areas. A well distributed population of species is also required by the Forest Service regulations implementing the National Forest Management Act (NMFA).

Reasonable Steps to Minimize Adverse Impacts Upon Subsistence Uses and Resources

Reasonable steps to minimize impacts on subsistence have been incorporated in development of the alternatives and project design criteria. During development of alternatives, an effort was made to minimize activities that could adversely impact important subsistence use areas. Project design criteria called for locating roads and units outside of important subsistence use areas such as the beach fringe, estuary fringe, and riparian areas adjacent to salmon streams. Units were assigned an importance rating based on inputs from many sources, including ADF&G Divisions of Subsistence, Habitat Conservation, and Wildlife Conservation; Sitka Fish and Game Advisory Board; Sitka Tribe of Alaska; and Sitka Conservation Society. These ratings were taken into consideration as alternatives were developed. For example, Alternative 3 avoids the majority of the highest valued subsistence areas.

Draft EIS Conclusions

The Record of Decision (ROD) for the Final EIS for the Northwest Baranof Project will include a final determination about the significant restriction on subsistence use that may result from implementation of the selected alternative. Below is a summary of the Draft EIS evaluation and findings.

(1) The potential foreseeable effects from the action alternatives in the Northwest Baranof Project do not present a significant possibility of a significant restriction of subsistence uses of brown bear, furbearers, marine mammals, waterfowl, salmon, other finfish, shellfish, and other foods.

(2) There is a significant possibility of a significant restriction of subsistence use of deer in the Project Area for Sitka residents regardless of which alternative is implemented.

(3) Among the communities with substantial or historic use of the Project Area WAAs, there is sufficient habitat capability to meet subsistence needs through the year 2040 in the areas throughout the region where Angoon residents harvest 90 percent of their community's deer. Areas used by Sitka are currently not sufficient for all subsistence demands.

Hearings

On the basis of findings of this analysis and under the provisions of the Alaska National Interest Lands Conservation Act, subsistence hearings will be held on the dates, times, and at the places announced in the letter accompanying the Draft EIS. Letters are being sent to the Federal Subsistence Board, Alaska Department of Fish and Game, Regional Fish and Game Advisory Councils, Local Fish and Game Advisory Committees, and to the City Government in Sitka where hearings will be held. Announcements will be made in newspapers and on the radio. Testimony at the hearings can be either verbal or written. People unable to attend are encouraged to have another person submit their written testimony at the hearing. If preferred, people can send written testimony to the Northwest Baranof Planning Team if postmarked on or before the date of the hearing in the community which the testimony is for. Testimony received, both verbal and written, will be incorporated into this Draft EIS, as determined to be necessary by the Forest Service, to produce the Final EIS.

Recreation and Scenic Quality

Recreation

Not all people desire the same experience or require the same setting for their recreation activities. If a person desires a primitive recreation experience, often the visual setting may be paramount. Although impacts to the visual environment can influence recreation, this relationship is not necessarily direct. The desire for a particular setting is personal and varies from one individual to another. At one extreme, individuals will demand an untouched setting and no contact with people outside of their group. These people often want the area where they recreate to be difficult to access with no human made items present other than what they themselves bring into the area. This type of experience fulfills a desire to be independent and gives a feeling that the experience has greater value because of the amount of work necessary to access the area. At the other end of the spectrum is the person who desires to have lots of contact with other people, who finds ease of access mandatory, and who wants their creature comforts (preferably provided by someone else). Even at this extreme the person may or may not find visual setting secondary to these social and comfort needs. Much of the tourism industry in Southeast Alaska relies heavily on the visual resources, yet extremely comfortable living and traveling conditions are provided. Other recreationists may find all visual, social, and comfort settings secondary to other experiences. Examples of this can be dedicated hunters, fishermen, and skiers. To these individuals all other things may be secondary to bagging their trophy or conquering another slope.

Although people vary widely in their expectations, some generalizations can be made about the usual settings where different types of recreation occur. One method for analyzing the consequences of proposed actions on recreation and tourism resources is based on changes in recreation setting for each alternative. Setting changes resulting from the proposed actions in any alternative would result in a change in the recreation opportunities and experiences available in the area.

A second method to address the effects of the proposed actions is the change which might occur in the physical or social characteristics of specific Recreation Places (see Chapter 3, Recreation, or the Glossary for more information on Recreation Places). It is these specific inventoried places and the quality of their settings that constitute a large portion of the recreation opportunities in the Northwest Baranof Project Area. Therefore, the degree of change in the size, setting, and recreation opportunities available in a Recreation Place is an important measure of the effect of an alternative on the recreation resource.

Recreation Setting

Each alternative for the Northwest Baranof Project provides a unique blend of settings for recreation opportunities, activities, and experiences. Setting differences due to varying amounts and distribution of timber harvest and/or road construction may influence the recreational experience that a forest visitor has, and as a result, also affect overall satisfaction.

All action alternatives shift the recreation setting from the more natural towards the more modified. The amount and location of this shift varies by alternative. Previously non-roaded areas and areas not adjacent to old cutting units may undergo the greatest change in setting. These changes will have a negative impact on those individuals seeking recreation in a natural setting and may have a positive impact on those who want or need roads for their recreational activities. Setting changes will most likely cause different recreational users to visit the area. The activities in which they participate, and the recreational experiences that they have will also change.

Logging changes the ground where roads are built and units are harvested to a modified setting. The presence of roads and units can also influence nearby areas and change them to a modified setting. To compare alternatives, we determined the acres of setting change. In addition, since most recreation in the Project Area is marine based and occurs in areas immediately adjacent to the saltwater, comparison of the miles of shoreline setting for each alternative provides further insight to the effects of setting change on recreation. Table 4-39 shows the acres of recreation setting by alternative. Table 4-40 shows the miles of shoreline setting by alternative.

Table 4-39
Recreation Setting Acres by Alternative

VCU	Natural Acres					Modified Acres				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
287	38,409	38,708	38,398	38,387	38,708	3,983	3,684	4,003	4,005	3,684
288	5,384	7,126	5,381	5,383	7,126	1,742	0	1,745	1,743	0
289	8,537	8,247	8,247	8,247	8,560	23	313	313	313	0
290	5,262	5,262	5,262	5,262	5,262	0	0	0	0	0
291	7,836	7,200	7,223	6,935	8,290	4,174	4,810	4,787	5,075	3,720
292	15,105	13,980	14,030	13,647	15,805	8,966	10,091	10,041	10,424	8,266
299	20,065	20,400	20,400	20,065	20,400	3,605	3,270	3,270	3,605	3,270
300	8,413	9,088	10,049	8,167	10,049	4,344	3,669	2,708	4,590	2,708
301	3,289	3,107	3,743	3,093	3,743	2,414	2,596	1,960	2,610	1,960
302	10,136	9,221	11,981	5,615	11,981	4,080	4,995	2,235	5,615	2,235
Total	122,436	122,339	124,705	117,787	129,924	33,331	33,428	31,062	37,980	25,843

Source: Flynn 1995. This information derived from the ROS inventory in the Chatham Area GIS

Table 4-40
Shoreline Miles by Alternative

VCU	Natural Miles					Modified Miles				
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5 No Action
287	23.0	23.2	22.9	22.9	23.2	0.9	0.7	1.0	1.0	0.7
288	10.7	10.7	10.7	10.4	10.7	0.0	0.0	0.0	0.3	0.0
289	12.2	12.2	12.2	12.2	12.2	0.0	0.0	0.0	0.0	0.0
290	5.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0
291	3.2	3.2	3.2	3.2	3.2	1.2	1.2	1.2	1.2	1.2
292	0.0	0.0	0.0	0.0	0.0	14.9	14.9	14.9	14.9	14.9
299	0.0	0.0	0.0	0.0	0.0	6.7	6.7	6.7	6.7	6.7
300	6.7	5.6	6.7	5.9	6.7	2.9	4.0	2.9	3.7	2.9
301	0.0	0.0	0.0	0.0	0.0	4.2	4.2	4.2	4.2	4.2
302	15.2	14.3	19.9	13.9	19.9	7.2	8.1	2.5	8.5	2.5
Total	76.0	74.2	80.6	73.5	80.9	38.0	39.8	33.4	40.5	33.1

Source: Flynn 1995.

There would be no setting change in Alternative 5, the no action alternative. Of the action alternatives, Alternative 3 would have the least impact on recreation. Alternative 3 would have the fewest acres changed from a natural to a modified setting because most harvest activities would be located near areas previously logged. More importantly, only 0.3 miles of shoreline would change setting because most harvest activities would be located near areas previously logged. Alternative 3 would also have fewer effects to recreation because it would locate harvest activities in those areas farthest from Sitka.

Alternative 4 would have the largest effect on recreation setting. It would affect the largest number of acres and shoreline miles of setting. Additionally, under Alternative 4, harvest activities would impact the greatest number of bays.

Although Alternative 2 would affect the second largest number of acres and shoreline miles, its actual effects on recreation would be less than Alternative 1, because Alternative 2 does not impact as many bays.

The Project Area is large compared to the number of acres of recreation setting that would be affected. In each action alternative, most of the new roads and units would be located away from the beach areas where most recreation use takes place. Relatively few acres would change setting and the percentage of change from the existing condition would be small. Because of this, the effects of setting change on the recreation resource are not expected to be significant.

Roads and Road Management Objectives (RMOs)

With the reconstruction and expansion of the road network for new timber harvest, some areas could be managed for motorized recreation. Roads will be built in all action alternatives, however road maintenance and access strategies vary for each alternative. Road Management Objectives (RMOs) provide direction for these road maintenance and public access strategies. For a detailed explanation and listing of RMOs see the Glossary and Appendix D. Public access strategies are an important part of the RMOs. These strategies vary according to physical and social resource concerns and the themes of the action alternatives. Although Alternative 4 provides the greatest number of miles of road constructed or reconstructed, Alternative 1 will provide the most miles of road available for roaded recreation. Roaded recreation opportunities within the Project Area will be limited, however, because the road systems will not be connected to a public road or the Marine Highway System. The most common vehicles that will be used are those that can be brought in by small boat such as off-road Vehicles (ORVs), motorcycles, and mountain bikes. The road systems will also be used for walk-in access.

Roads that are closed by installing waterbars could continue to be used by off road vehicle (ORV) users if the traffic level is high and the individuals users make an effort to keep the roads open. Currently, ORV users are removing blowdown timber and cutting out enough alder regrowth to maintain ORV access on portions of the St. John Baptist Bay road system. This will probably continue to occur and may expand to new roads constructed under this project. Removal of bridges and large culverts will probably block passage to ORVs in some alternatives, however this may not stop access by foot traffic if the perceived attraction is great enough. We expect this to occur on the Schulze Cove road system in Alternatives 1, 3, and 4. In Alternatives 3 and 4, portions of the Schulze Cove road system will receive maintenance, although access will be discouraged. In Alternative 1, only Maintenance Level 1 is planned and vehicle access would be eliminated. In reality a lake, which the road will provide access to, will probably be a large enough attractor to keep people using the road. The presence and heavy use of the Piper Island Recreation Cabin in Schulze Cove will draw a fairly large number of recreationists to the area. Many of these cabin users will want to investigate the lake. Increased access to all areas, especially if accompanied by motor vehicle or ORV use, will increase pressure on game species and sport fishing. This use may diminish over time if alder regrowth slowly closes the road to ORV and foot traffic.

Recreation Places

Appendix F includes tables and maps showing changes to Recreation Places in each alternative.

Effects to Recreation Places can be divided into those of short and long term. Short-term effects are caused by the presence of workers and the activities associated with logging, road construction, LTFs and HILTS, and logging camp operations. Long-term effects are those which occur due to the physical alterations of the Project Area which persist after the active effects have ended and the workers have left the area.

The short-term effects will probably have the greatest impact on people who use the Project Area for recreation. Due to noise, visual impacts, and the resulting change in recreational setting, many existing recreation activities are incompatible with an active logging operation. During timber harvest operations, the roads, sort yards, LTFs and HILTS, log raft storage areas, and logging camps are often located at or near recreational anchorages.

These recreational anchorages may not be suitable or desirable for general public use during the active portion of logging. Logging operations are historically active for three to five years, and this is expected to be the case for the Northwest Baranof Project as well. Recreationists may avoid areas of active logging because the areas do not fulfill their expectations of a wildlands experience. One provider of commercial wildlife viewing tours, however, has stated that they would use the opportunity to show their clients an active LTF. Noise from logging operations may affect the solitude and experiences of logging camp residents for fish, wildlife, and other forest products may discourage other recreation and subsistence users. As displaced users become aware that logging operations have ceased, use w ill slowly increase again.

After active logging operations in the Project Area have ended, physical alterations to the Recreation Places will be the long-term effects which may alter the experiences and use patterns of recreation users. Generally, we estimate the long-term effects of all action alternatives in this project to be less significant than the short-term effects on recreation. Over time, brush and trees will grow back in the units. This will reduce the visual impacts. Most harvest activities will occur along existing road systems or near areas where past harvest occurred away from the shorelines. The majority of these existing road systems are heavily brushed in and will be reopened for the sale. Four to five years after the sale is closed out, alder growth will clog many of the roads and they will resemble their present condition.

Analysis by the Forest Service has concluded that approximately 50 percent of the current activities occurring in Recreation Places rely upon the natural appearance of the areas (Forest Service 1990). If a Recreation Place is entered for timber harvest, those activities that are incompatible will cease until the area returns to a natural setting. It has been estimated that the natural appearance of the area returns after one rotation. As a result, a Recreation Place entered for timber harvest would see a decline in at least some types of recreation activity for 40 to 150 years. The degree to which roading and harvesting have an impact on a Recreation Place determines whether its unique characteristics are lost or remain.

4 Environmental Consequences

Most of the Recreation Places in the Northwest Baranof Project Area are accessed by boat, the most economical and flexible mode of travel for this area. None of the action alternatives for this Project will completely eliminate a Recreation Place, however, many Recreation Places will be substantially altered by management activities. The extent of these changes varies with the location and management of roads, and the location of planned cutting units. Except at LTF and HILTS sites, a beach buffer will protect most anchorages and beaches. Although people will most likely continue to use these places, changes in the surrounding areas will change the recreational experiences.

Table 4-41 shows the size and setting of each Recreation Place in each alternative.

Table 4-41
Recreation Place Setting and Acres by Alternative

Recreation Place	Setting	Alt. 1	Alt. 2	Alt.3	Alt. 4	Alt. 5 No Action
Neva Strait*	N	478*	370*	843*	370*	843*
N.E. Neva	M	0	473	0	473	0
Nakwasina Passage*	N	501*	501*	501*	501*	501*
St. John Baptist Bay Road System	M	7,172	4,720	4,720	5,963	4,720
Nak.Passage/St. John Road	N	346	346	346	508	346
St. John Road Uplands	N	503	503	503	503	503
Channel Rocks	N	200	200	200	200	200
Fish Bay Road System	M	2,828	2,828	2,828	2,828	2,828
Head of Fish Bay	N	211	211	211	211	211
Haley Anchorage/Haley Point	N	662	662	662	662	662
Haley Point Uplands	N	3,841	3,841	3,841	3,841	3,841
Bear/Baby Bear Bay	N	784	798	784	784	798
Range Creek Cove/Yellow Point	N	270	270	270	270	270
Rodman Bay	M	3,524	1,862	2,370	2,370	2,215
Sinitsin Cove*	N	2*	2*	2*	2*	2*
Nismeni Cove	N	396	396	396	396	396
Pogibshi/Goose Cove	N	375	375	375	375	375
Launch Cove/Island Point	N	331	331	331	331	331
Schulze Cove/Piper Island	N	645	610	645	645	610
Schulze Cove Road System	M	670	0	802	802	0
Nakwasina Sound, East *	M	331*	250*	250*	331*	250*
Hemorrhoid Lake	N	675	675	675	675	675
Appleton Cove	M	0*	498*	0*	0*	145*
Head of Nakwasina Sound	M	569	569	569	567	569
Rosenberg Lake	N	2,076	2,076	2,076	2,076	2,076
Nakwasina Passage Road System	M	1,288	1,254	1,254	1,288	1,254
Total Acres		28,678	24,621	25,454	26,972	24,621

* Recreation Place extends beyond the Project Area. Acres listed are only for that portion within the Project Area.
Source: Flynn 1995.

See Appendix F for Recreation Place maps for each alternative.

Fourteen Recreation Places are unaltered in all Alternatives. These Recreation Places are:

Channel Rocks
Haley Point Uplands
Haley Anchorage/Haley Point
Head of Fish Bay
Fish Bay Road System
Sinitsin Cove
Range Creek Cove/Yellow Point
Pogibshi/Goose Cove
Launch Cove/Island Point
Nismeni Cove
Nakwasina Passage
St. John Road Uplands
Hemorrhoid Lake
Rosenberg Lake

Recreation Places expand, contract, split, or consolidate with others depending on the location of harvest units, roads, and LTFs. Roaded Recreation Places vary according to the Road Management Objectives (RMOs) for specific roads in each alternative. (See the discussion of RMOs in this section.) Because of this variation by RMO, using total acres of Recreation Places by alternative to determine relative effects to the recreation resource can be misleading. By considering the number and location of Recreation Places affected, changes to recreation setting, and the change in size of the Recreation Places (while factoring in the effects of RMOs), an evaluation can be made as to the relative magnitude of effects of alternatives on the recreation resources.

Alternative 4 would have the greatest impact on recreation. Alternative 4 would affect ten existing Recreation Places located in Rodman Bay, Schulze Cove, St. John Baptist Bay, Neva Strait, Nakwasina Passage, and Nakwasina Sound. It would also create two new Recreation Places. One Recreation Place would be created by the Schulze Cove road system. The other would be created when the existing Neva Strait Recreation Place is split due to changes in the recreation setting.

Alternative 1 would have the second largest effect on recreation. It would affect eight existing Recreation Places located in Rodman Bay, Schulze Cove, St. John Baptist Bay, Neva Strait, and Nakwasina Sound. It would create the Schulze Cove Road System Recreation Place.

Alternative 2 would have the third largest effect on recreation. It would affect three existing Recreation Places located in Rodman Bay and Neva Strait. Although Recreation Places in Nakwasina Sound, Nakwasina Passage, and St. John Baptist Bay would not be directly affected, nearby activity would influence use of Recreation Places in those bays. Alternative 2 would create a new Recreation Place when the existing Neva Strait Recreation Place is split due to changes in the recreation setting.

Of the action alternatives, Alternative 3 would have the least impact on recreation. It would affect four Recreation Places located in Rodman Bay and Schulze Cove. Although Alternative 2 directly affects fewer Recreation Places than Alternative 3, harvest activity is concentrated north of Fish Bay in Alternative 3, therefore there will be little or no indirect effects to Recreation Places south of Fish Bay.

Recreation Special Use Permits

Setting changes, though relatively small in the context of the entire Project Area, could appear substantial for specific locations within the Project Area. In the short term, human activity due to field reconnaissance, timber layout, road construction, logging, and logging camp activity may reduce the overall desirability and suitability of the area for recreation and tourists desiring some types of wildlands experiences. This could adversely effect providers of commercial services. Brown bear hunting will be particularly affected due to the bears' desire to avoid human activity. These effects will decrease as harvest activities end and logging camps are closed. Long-term increases in roads and roaded recreation, however, will lead to increased access to the Project Area. With more people in the area, the chance for human/bear conflicts will increase which may result in more bears killed in defense of life and property. Increased human activity may also change bear use patterns of the area. These two problems could result in fewer bears being located by outfitter/guides, which could result in dissatisfied clients.

Providers of commercial services may not be affected, or they may be affected in a couple of ways:

- They may be displaced to other areas that provide the natural setting and amenities that their clients are seeking. This may conflict with existing operations already established, or may increase pressure on Wilderness, Monument, and Legislated LUD II areas.
- They may develop substitute activities that do not require a totally natural or primitive setting. This may require new marketing strategies to capture a different segment of the recreating public.

All action alternatives would have some impacts on guided and non-guided brown bear hunting within the Project Area in the short term. Increased activity in the project area during the period of sale planning, layout, and active logging would discourage bears from coming down to the shoreline. Since most brown bear hunting is done by spotting from a boat and then stalking, hunting success would be reduced. See the discussion on outfitters and guides in the Economics section later in this chapter.

Special Areas

Fish Creek Hot Springs was identified in TLMP Revision as a Special Interest Area. It is unaffected in all alternatives. A parcel of land extending south from Yellow Point has been selected by the State of Alaska for possible designation as a State Marine Park. This parcel includes Baby Bear Bay, Bear Bay, and Bear Island. This parcel will not be affected by any alternative. (Note: the Bear/Baby Bear Recreation Place extends beyond the boundaries of the proposed State Marine Park. Do not confuse effects to the Recreation Place with effects to the park.)

The Sitka District Coastal Management Program "Public Use Management Plan" (June 1993) prepared by the City and Borough of Sitka identifies the Fish Bay Hot Springs Trail, the Big Bear/Baby Bear Bays State Marine Park, and the Nakwasina Passage to the head of Nakwasina Sound "Special Management Areas. The Fish Bay Hot Springs Trail, and

the Big Bear/Baby Bear State Marine Park will not be affected in any alternative. The Nakwasina Passage to the head of Nakwasina Sound "Special Management Area" will be impacted in Alternatives 1 and 4 by LTF activity at Noxon Creek and the HILTS at the head of Nakwasina Sound. The City and Borough of Sitka will need to determine if these LTFs are consistent with the management intent of their Coastal Management Plan for this area.

Recreation Use and Trends

We do not have quantitative recreation use information for the dispersed Recreation Places within this Project Area, however past uses, trends, and surveys can be analyzed to indicate the general nature of recreationists in Southeast Alaska. Sources for these trends and surveys include the Supplement to the Draft EIS for the TLMP Revision (1991), State Comprehensive Outdoor Recreation Plan (1988), Sitka Economic Base Study Statistical Update (1994), discussions with providers of commercial services such as outfitters, guides, air taxis, and cruise ship operators, and discussions with recreationists. While some of the sources may be broad in the context of applying it to a site specific area such as Northwest Baranof, the findings of the sources are generally consistent. Thus, some generalization can be made of the probable consequences of the various alternatives.

Analysis for the Supplement to the Draft EIS for the TLMP revealed several recreation trends for Southeast Alaska which can be viewed in a similar context for the Northwest Baranof Project Area. Recreation use can be used to project demand for different settings into the future. Demand for all settings is growing. The greatest increase in demand is for unmodified shorelines away from major marine travel routes which are accessible by small boats. It is this setting that characterizes and defines the marine nature of recreation on the Tongass National Forest. It appears demand can be met into the future for all except this setting. Demand for this setting is expected to exceed supply by the end of the decade. All action alternatives will contribute to this decline in small boat accessible unmodified shorelines.

Surveys suggest residents of Southeast Alaska value opportunities for remote, uncrowded wildland and marine outdoor recreation. Visitors to Southeast Alaska often expect unaltered pristine settings. Cruise ship companies and other recreation/tourism providers often market the "Alaska Mystique". Advertisements for these providers often show cruise ships with glacial ice floating all around, small colorful towns, wild animals, and rugged mountains. The advertisements give the impression of an uncrowded land with little evidence of human impacts.

Cumulative Effects

Setting changes in all alternatives are not substantial for the Northwest Baranof Project Area. The Project Area contains only a small proportion of the total recreation opportunities on the Tongass National Forest, however other projects of a similar nature which are planned or are in various stages of completion for nearby areas may subtly change the overall character of the collective area and will cause the recreation experience

to shift from that of a more natural one to that of a more modified landscape. This shift is within the scope of the parameters outlined within the Tongass Land Management Plan.

Future entries into this area, and those planned in adjacent areas, would continually shift the settings of the Recreation Places from natural to modified. Over time, the activities and experiences would change as well. There will be increased competition for those recreational places with natural settings, especially for unmodified shorelines away from major marine travel routes which are accessible by small boats. The activities of subsistence users, resident recreationists, tourists, outfitters and guides, and tour and cruise ship operators may not always be compatible. Conflicts among users may occur and social encounters are likely to increase. This will increase the need for active management of the various users in some areas, furthering the shift to developed and regimented settings.

With the logging of the Project and nearby areas, there would be a general displacement or elimination of recreational users who are seeking a wildlands experience. This would also occur with the outfitters and guides who provide a wildlands experience for clients. Outfitters have several options in changing the activities and services they provide and in capturing new market segments. Recreationists have similar options. On the other hand, the continual development would open up the Project Area to recreation activities that are not dependent on a natural setting. This would particularly be true if the small isolated road networks are connected over time.

Scenic Quality

Visual impacts associated with proposed activities, such as road construction, clearcut logging methods, and LTFs, usually are a result of the introduction of unnatural lines and textures which contrast with the surrounding natural appearing landscape. The no action alternative (Alternative 5) would result in no additional changes to the scenic quality of the area. All action alternatives would result in additional visual impacts of varying degrees in the Project Area.

Log Transfer Facilities and Logging Camps

Log transfer facilities (LTFs) present a very strong visual impact when viewed within a foreground distance because they are large, located near saltwater, and have a bold linear shape. Their relative low profile helps to blend them into background views. Clearings for sort yards and logging camps also add to the visual impacts associated with LTFs. However, their location, which is usually on fairly level or gently sloping sites, helps to absorb much of their visual contrasts when viewed from saltwater. Floating logging camps are being considered for this project. Visual impacts from these are considered to be much less than more permanent upland camps.

Slide-type LTFs usually present less of a visual impact than larger bulkhead-type facilities. The bold form of the bulkhead associated with barge LTFs prevents it from blending into the surrounding landscape. Often, the type of material and color of the bulkhead creates strong contrasts that can be seen even in the background distance zone. Careful selection of materials and colors can effectively mitigate such contrasts. Proposed

LTF locations are displayed in Figure 4-xx. (It has been assumed that bulkheads will be removed at the end of the sale.)

Resulting Cumulative Effects (Future Visual Condition)

Alternatives 1 through 4 would result in additional visual impacts of varying degrees in the Northwest Baranof Project Area. These impacts would come primarily from clearcut harvest methods, road construction, and the construction of Log Transfer Facilities (LTFs). These activities create unnatural lines and textures in the landscape which contrast with the rough, even-texture characteristic of Southeast Alaska old-growth rainforest. These visual impacts, in many cases, will be evident to the average national forest visitor.

Field observations, topographic map analysis and computer-generated perspective simulations were used to determine the visual impacts of the various alternatives. The VQOs that would result from the proposed actions will be the Future Visual Condition. This evaluation assumes that the design criteria for the visual resource, described in Section C, will be implemented during unit layout.

Table 4-42 displays the Visual Quality Objectives (VQOs) resulting for each alternative's activities. For Alternative 5, only the inventoried VQOs are shown and for Alternatives 1 through 4 the VQOs resulting from implementation of the proposed actions are displayed.

Table 4-42
Visual Quality Objectives (VQOs) by Alternative and in Acres

VQO	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Retention	3,216	3,208	3,208	3,216	3,216
Partial Retention	47,070	49,258	46,884	40,510	61,046
Modification	75,774	75,441	75,968	81,950	64,030
Maximum Modification	29,670	27,853	29,670	30,084	27,468

Maximum Disturbance Threshold defines how much disturbance can happen in any given area while still meeting the intended VQO.

We used Maximum Disturbance Thresholds (MDT) as our analysis criteria. Proposed harvest unit acres are combined with existing harvest unit acres (those with conifer regeneration less than 30 feet in height) as a percentage of the total acres of that VQO within the VCU. The resulting percentage is then compared to the Maximum Disturbance Threshold to determine potential negative visual impacts. These then are the expected or planned Visual Cumulative Effects.

The resulting or expected visual cumulative effects for the action alternatives are summarized below:

4 Environmental Consequences

Effects Common to All Action Alternatives (1 through 4)
VCU 287 is 20% over the MDT in Retention VQO.
VCU 299 is 45% over the MDT in Retention VQO.
VCU 300 is 10% over the MDT in Retention
VCU 301 is 5% over the MDT in Retention VQO.

Alternative 1
VCU 291 is 10% over the MDT in Maximum Modification VQO.
VCU 292 is 13% over the MDT in Partial Retention VQO.
VCU 299 is 36% over the MDT in Maximum Modification VQO.
VCU 301 is 5% over the MDT in Partial Retention VQO.

Alternative 2
VCU 291 is 11% over the MDT in Maximum Modification VQO.
VCU 292 is 18% over the MDT in Partial Retention VQO
VCU 299 is 34% over the MDT in Maximum Modification VQO.
VCU 301 is 6% over the MDT in Partial Retention VQO.

Alternative 3
VCU 291 is 11% over the MDT in Maximum Modification VQO.
VCU 292 is 16% over the MDT in Partial Retention VQO.
VCU 299 is 34% over the MDT in Maximum Modification VQO.
VCU 301 is 2% over the MDT in Partial Retention VQO.

Alternative 4
VCU 291 is 11% over the MDT in Maximum Modification VQO.
VCU 292 is 19% over the MDT in Partial Retention VQO.
VCU 299 is 36% over the MDT in Maximum Modification VQO.
VCU 301 is 6% over the MDT in Partial Retention VQO.

Alternative 1

This alternative distributes harvesting and road building activities throughout the Project Area as stated in the purpose and need for the Northwest Baranof Project. The current visual quality along the Alaska Marine Highway route between Fish Bay and St. John Baptist Bay and between Nakwasina Passage and Starrigavan Bay is maintained.

Of the eight VCUs, entered six would have a total of 18 units which do not fully meet the Visual Quality Objective. There are four VCUs which will exceed the Maximum Disturbance Threshold for the Retention VQO; two for Partial Retention VQO and two for Maximum Modification. The existing visual condition of the VCUs entered by this alternative ranges from natural appearing to heavily altered. The future visual condition resulting from implementation of this alternative will vary by VCUs as follows: VCUs 287 and 299 will appear slightly altered; VCUs 288, 300, and 302 will appear moderately altered; VCUs 292 and 301 will appear heavily altered; and VCU 291 will not substantially change.

Alternative 2

This alternative distributes harvesting and road building activities throughout the Project Area as stated in the purpose and need for the Northwest Baranof Project. The current visual quality along the Alaska Marine Highway route between Fish Bay and Starrigavan is maintained.

Of the six VCUs entered, four would have a total of 20 units which do not fully meet the Visual Quality Objectives. The existing visual condition of the VCUs entered by this alternative ranges from naturally appearing to heavily altered. The future visual condition resulting from implementation of this alternative will vary by VCUs as follows: VCU 289 will appear slightly altered, VCU 300 will appear moderately altered, VCU 302 will appear heavily altered, VCU 292 will appear extremely altered and VCUs 291 and 301 will not substantially change.

Alternative 3

Under this alternative, timber harvest and road building would be concentrated north of Fish Bay. The current visual quality along the Alaska Marine Highway route between Fish Bay and Starrigavan Bay is maintained. This alternative creates the least impacts of the action alternatives.

Of the five VCUs entered, four would have a total of 16 units which do not fully meet the Visual Quality Objectives. There are four VCUs which will exceed the Maximum Disturbance Threshold for the Retention VQO; two for Partial Retention VQO and two for Maximum Modification. The existing visual condition of the VCUs entered by this alternative ranges from naturally appearing to heavily altered. The future visual condition resulting from implementation of this alternative will vary by VCUs as follows: VCUs 287 and 289 will appear slightly altered, VCU 288 will appear moderately altered and VCUs 291 and 292 will appear extremely altered.

Alternative 4

Under Alternative 4, timber harvest and road building would be distributed throughout the Project Area. This alternative would have the greatest impacts on the visual resources in the Project Area.

Of the nine VCUs, seven would have a total of 29 harvest units which do not fully meet the Visual Quality Objectives. There are four VCUs which will exceed the Maximum Disturbance Threshold for the Retention VQO; two for Partial Retention VQO and two for Maximum Modification. The existing visual condition of the VCUs entered by this alternative are natural appearing. The future visual condition resulting from implementation of this alternative will vary by VCUs as follows: VCUs 287, 289, 299, and 300 will appear slightly altered; VCU 288 will appear moderately altered; VCUs 302 and 300 will appear heavily altered; and VCUs 291 and 292 will appear extremely altered.

Alternative 5

Alternative 5 is a no action alternative and would produce no additional visual changes in the Project Area. The existing visual condition ranges from natural appearing in VCU 288 and 289 to heavily altered in VCUs 291 and 292.

Heritage Resources

Heritage resources are an integral part of the natural environment and are nonrenewable. Impacts to heritage resources can be irreversible and permanent.

In conducting heritage resource investigations in the Project Area, archeologists identified one traditional property and 41 sites which are eligible for inclusion in the National Register of Historic Places (Chapter 3). Many of these sites - whether prehistoric or historic - contain information about both environmental conditions and the lifestyles of former occupants of the area. Traditional properties and historic sites have cultural significance to contemporary Sitka Tlingit.

The National Historic Preservation Act of 1966 as amended (NHPA) directs Federal Agencies to take into account the effect of an undertaking on historic properties (Section 106). "Historic property" as used in NHPA means "any prehistoric or historic district, site, building, or object included in, or eligible for inclusion in the National Resister (36 CFR 800.29 (e)). Federal regulations (36 CFR 800) govern the Section 106 review process. Agency archeologists are completing the Section 106 Process for the proposed timber sale. This process includes the completion of a formal Determination of Effect in consultation with the State Historic Preservation Officer, the Advisory Council on Historic Preservation, Indian Tribes, and interested parties.

In this analysis we have examined roads, units and LTF sites as proposed in the alternatives. The effects of logging camps (whether ground or water based), HILTS, sort yards, or other developments which occur more than 100 meters away from displayed activities are not analyzed here. We have not established exact locations for these activities, and are not yet able to determine their effects on historic properties under the NHPA. These activities will be subject to further Section 106 review. In addition, consultation with the Sitka Tribe of Alaska is ongoing and additional sites may be identified.

Direct and Indirect Effects

Direct impacts to historic sites can include alterations to the setting of sites, alterations of above-ground objects, features and structures, and disturbance of subsurface deposits. Indirect effects may include changes in stream channels, sedimentation patterns or slope stability brought about by project activity near historic properties.

Sites are considered to be at risk of direct or indirect impact based on the proximity of project activities. As a general rule, project activity occurring within the boundary or within a 100 meter (330 feet) buffer zone of a historic site will have a direct effect on the resource. Project activity at a distance of greater than 100 meters may indirectly effect a historic site. The risk diminishes significantly as the distance increases.

The following section lists potential direct and indirect effects by alternative. In the analysis of possible indirect effects we list all project activity planned at a distance of 0.3 mile or less from historic sites. No indirect effects are anticipated, however, as a

precautionary measure archeological review of the final designs for specified activities is required.

Alternative 5 will result in no direct or indirect effect to heritage resources. Historic sites will continue to decay due to natural causes, such as weather and erosion.

Direct Effects

Alternatives 1, 3, and 4

No project activity will have a direct effect on any known historic site in any of these alternatives.

Alternative 2

Without stipulations the reconstruction of road 7558 could have a direct effect on Sites 46 SIT 412 and 49 SIT 413. The current road, built during the early 1960's, impacted these two small shell middens. Direct effects will be avoided with implementation of the following stipulations.

Stipulations
Reconstruction along road 7558 between Lisa Creek and the existing LTF site will be limited to the existing road surface or the down slope, water-side of the existing road surface.

No ditch line excavation will be planned upslope of the existing road between Lisa Creek and the existing LTF site.

An archeologist will work with the road designer in planning the road segment between Lisa Creek and the existing LTF site. The road design will be subject to approval by the Forest Archeologist.

Excavation in and around the existing LTF site will require archeological review.

An archeologist will monitor road and LTF reconstruction at the time of implementation. If there is any threat to the archeological sites or if additional archeological resources are encountered project activity will stop.

Any changes in the road or LTF location will be subject to review under Section 106 of the National Historic Preservation Act of 1966 as amended.

Indirect Effects

The following units, roads and LTFs lie within less than 0.3 mile of known historic sites.

Table 4-43
Project Activity With in 0.3 mile of Historic Properties

Activity	Distance and Direction From	Site 49 SIT	Alt. 1	Alt. 2	Alt. 3	Alt. 4
VCU 302						
Road 7583	0.2 mile northwest of	390	x	x		
St. John Baptist LTF (at terminus of Road 75831)	0.2 mile northwest of	390	x	x		
Unit 6271	0.2 mile east of	392	x			
	0.3 mile southeast of	391	x			
Unit 6293	0.3 mile east of	394	x	x		x
Road 758313	0.3 mile east of	394	x	x		
VCU 300						
Road 75831S	0.2 mile northwest of	408		x		x
	0.2 mile northwest of	409		x		x
	0.3 mile west of	397				x
Road 75851	0.2 mile east of	399				x
	0.3 mile east of	398				x
Nakwasina Passage LTF (at terminus of Road 75851)	0.3 mile southeast of	399				x
VCU 301						
Road 75581	0.2 mile east of	410	x			x
	0.1 mile southeast of	414		x		
Lisa Creek LTF (at terminus of road 7558)	0.1	415		x		
Road 7558	adjacent to	412		x		
Road 7558	adjacent to	413		x		

Currently no indirect effects are anticipated in Alternative 1, 2, or 4 from the above listed activities. As a precautionary measure, however an archeologist will be notified at the final design stage for these activities. The archeologist will consult with hydrologists, soil scientists and engineers to ensure that archeological sites will not be damaged indirectly

by project activity.

In Alternative 3, no project activity occurs at a distance of 0.3 mile or less from any historic site. No indirect effects are anticipated.

Cumulative Effects

Cumulative effects on heritage resources occur through natural erosion and weathering as well as from continued development on lands containing heritage sites.

Much of the Project Area encompasses territory traditionally claimed by the Sitka Tlingit and the Angoon Tlingit. Northwest Baranof was also the venue of an important event in the history of the local Tlingit; the Sitka Kiks.ádi Survival March (Chapter 3). While project activity cannot have an effect on an historic event, continued federal management activities have a long range, commutative effect on the landscape; a place of importance to the Sitka and Angoon Tlingit. The Forest Service seeks to participate in partnerships and challenge cost share agreements to promote awareness and interpretation of the local heritage.

As seen in the cases of 49 SIT 412 and 49 SIT 413, historic sites in the Project Area have been damaged by timber harvest activity (during the 1960's). The Chatham Area began consistently implementing the inventory, evaluation, and assessment of effects through the Section 106 Process in the early 1980's. If the historic sites in the Project Area are avoided and protected using the appropriate mitigation measures, there should be no additional cumulative effects to historic sites.

Lands

Lisianski Peninsula

Alternatives 1 and 4 would result in construction of a little more than 0.5 mile of new road through State Selection AA-71691 (NFCG-305), Lisianski Peninsula. There is approximately another 0.25 mile of existing road within this selection which would also be used. The Forest Service can construct new road through this unconveyed State selection only if the State Department of Natural Resources (DNR) concurs under authority of Sec. 906(k) of the Alaska National Interest Lands Conservation Act of December 2, 1980 (ANILCA). After obtaining DNR concurrence, the Regional Forester can issue a Federal Right-of-Way Reservation which would allow road construction and would mature into an easement if the lands are conveyed. On January 11, 1995, the Forest Service applied to DNR for ANILCA 906(k) concurrences, so this new road could be constructed. The existing road segment can be used without State concurrence and an easement can be reserved on it, upon conveyance.

Alternative 2 would result in approximately 1.5 miles of reconstruction of existing road and reconstruction of an existing log transfer facility (LTF), both projects overlaying State Selection AA-71691, and Native Allotment Applications J-011250 (Eddie Marshall, deceased) and A-060985 (Johnny John, deceased). These claims are located on Lisianski Peninsula in VCU 301. The existing road and upland portions of the LTF will not require future approvals from the State and an easement can be reserved upon conveyance on portions that cross the State selection. Road construction and long-term access across the two Native allotment claims generally require a Deed of Further Assurance from the Tlingit Haida Central Council. On January 11, 1995, the Forest Service applied to the Tlingit Haida Central Council for a Deed of Further Assurance to secure long-term access across these two claims.

Big Bear/Baby Bear

Harvest units 5001 and 5002 (in Alternatives 1, 3, and 4) are immediately adjacent to State Selection AA-71693, at Big Bear/Baby Bear. This selection has not been conveyed to the State and is unsurveyed. Selection boundaries would need to be identified during unit layout to avoid encroaching on the State selection.

Nakwasina Sound

Harvest units 8032 and 8065 (in Alternatives 1 and 4) are adjacent to Native Allotment Application J-10940 Hertigate Resources (the heirs of Mary Gray, deceased), located in VCU 299, at Nakwasina Sound. This application has not been surveyed so allotment boundaries need to be positively identified on the ground during unit layout to avoid encroaching on the claim.

Log Transfer Facilities

Alternative 1 would result in reconstruction of old log transfer facilities (LTFs) at the north side of Rodman Bay (VCU 292), the north side of St. John Baptist Bay (VCU 302), and Noxon Creek (VCU 299). It would also result in the construction of new LTFs at the south side of Rodman Bay (VCU 292), Schulz Cove (VCU 287), and Lisa Creek (VCU 301). The Forest Service does not hold authorizations for any of these facilities and would need to acquire all state and federal permits.

Alternative 2 would result in reconstruction of old LTFs at the north side of Rodman Bay (VCU 292), the north side of St. John Baptist Bay (VCU 302), and Lisa Creek (VCU 301). It

would also use an existing LTF at Appleton Cove (VCU 293). The Forest Service does not hold authorizations for facilities at Rodman Bay, St. John Baptist Bay, or Lisa Creek and would need to acquire all state and federal permits at these sites. At Appleton Cove, the Forest Service holds current authorizations.

Alternative 3 would result in reconstruction of an old LTF at the north side of Rodman Bay (VCU 292) and the construction of new LTF's at the south side of Rodman Bay (VCU 292) and Schulz Cove (VCU 287). The Forest Service does not hold authorizations for any of these facilities and would need to acquire all state and federal permits.

Alternative 4 would result in reconstruction of old LTF's at the north side of Rodman Bay (VCU 292) and Noxon Creek (VCU 299). It would also result in the construction of new LTF's at the south side of Rodman Bay (VCU 292), Schultz Cove (VCU 287), the south side of St. John Baptist Bay (VCU 302), Nakwasina Passage (VCU 300), and Lisa Creek (VCU 301). The Forest Service does not hold authorizations for any of these facilities and would need to acquire all state and federal permits.

Comparison of Alternatives

Alternatives 3 and 5 would result in the least conflicts from land status. Alternatives 1 and 4 would result in more conflicts, and Alternative 2 would result in the most conflicts.

Careful on-the-ground location of State selection and Native application boundaries will prevent unintentional encroachment of these claims from adjacent harvest units proposed in Alternatives 1 and 3. Direct conflicts result from the new road construction across State Selection AA-71691, at Lisianski Peninsula (proposed in Alternatives 1 and 4), and in the road and LTF reconstruction across Native Allotments J-011250 and A-060985, also at Lisianski Peninsula (proposed in Alternative 2). Of these, the greater concern is with the two Native allotments because we anticipate more difficulty acquiring a Deed of Further Assurance from the Tlingit Haida Central Council than in obtaining ANILCA 906(k) concurrence from the State DNR.

Alternative 1 would result in reconstruction of three old LTF's and construction of three new ones. All six would require acquisition of state and federal authorizations by the Forest Service. Alternative 2 would result in reconstruction of three old LTF's and use of one existing LTF. The Forest Service has authorization for the one existing site but not the three old ones. Alternative 3 would result in reconstruction of one old LTF and construction of two new ones. The Forest Service does not hold authorizations for any of these sites. Alternative 4 would result in reconstruction of two old LTF's and construction of five new ones. The Forest Service does not hold authorizations for any of these sites. Thus, Alternatives 1 and 4 would require the acquisition of more LTF authorizations than Alternatives 2 and 3. Alternative 5 would not require any new authorizations.

Transportation Systems and Facilities

Roads

Permanent roads are constructed under the terms of timber sale contracts or by means of formal road construction contracts. Between periods of commercial timber haul, roads would be managed as prescribed by their Road Management Objectives (RMOs) for possible future access needs. Management strategies may range from keeping the road open and maintaining the road for incidental traffic, to intermittent periods of closure during which natural vegetation would be allowed to grow over the road surface. In all cases, drainage would be maintained to protect watershed resources. During periods of closure roadways would be seeded with grass. Maintenance would be performed only as needed to protect the structural integrity of the roadway. These maintenance practices facilitate restoration of roads for future use and reduce erosion and sedimentation.

Timber purchasers construct temporary roads to harvest timber on a short-term, one time basis. These roads do not become part of the permanent transportation system. After harvest, drainage structures are removed. The road surface, cut banks, and fill slopes are seeded with grass and waterbars are installed. These steps prevent erosion and allow the roads to be reclaimed by forest vegetation.

Table 4-44 displays the miles of new road construction, reconstruction, and temporary roads for each alternative.

Existing roads may be reconstructed for this project. Reconstruction consists of removing trees and brush and reestablishing the road surface. Drainage structures would be inspected and replaced as needed to bring the road up to current Forest Service standards.

Table 4-44
New Construction and Reconstruction Roads (in miles)

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
New Construction (miles)	18.5	18.5	8.9	30.4
Reconstruction (miles)	11.9	13.1	9.0	16.5
Temporary Road (miles)	10.0	8.2	6.8	14.5
Total Road Miles	40.4	39.8	24.7	61.4

Source: Allio 1995.

The environmental consequences from roads are described in the Geology, Soils, Water, Fish, Subsistence, Recreation, and Heritage Resources sections of this chapter.

Direct Effects

The clearing widths required for road development are dictated by steepness of the terrain and road design standards. Steeper terrain generally requires wider clearing limits resulting in a greater number of acres of vegetation cleared.

Indirect Effects

Access roads average six acres of clearing per mile of road. Land cleared for roads that will be maintained for future resource access will be removed from natural resource production. Rock used for construction of system roads will become a permanent part of the road's subgrade. Rock used to construct temporary roads may be reclaimed after its use and used for other road construction in the Project Area. Table 4-45 compares road clearing by alternative. RMOs for each road in each alternative are discussed in Appendix D.

Table 4-45
Road Clearing by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Acres of Clearing	242	239	148	368

Source: Allio 1995

Log Transfer Facilities

This Draft EIS considers a total of ten sites for log transfer facilities (LTFs) three types of log transfer facilities proposed in this project are described in Chapter 2 (page).

Five of the LTF sites proposed in this project were used in previous harvests, including two sites in Nakwasina Sound (Noxon Creek and Lisa Creek), one site in St. John Baptist Bay, one site in Rodman Bay, and one site in Appleton Cove. Five new sites are proposed and are dispersed throughout the Project Area. The new LTF sites are planned as low angle, drive down ramp facilities. Alternative maps display proposed LTF sites for each alternative in the Northwest Baranof Project Area.

Table 4-46
Volume of Timber to be Processed (mmbf) at Each Log Transfer Facility (LTF) or Helicopter Insertion Log Transfer Site (HILTS) by Alternative

	Estimated Sawlog Volume (mmbf) to be Processed			
LTF/HILTS	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Appleton Cove*		5.7		
NE Rodman	4.3		5.6	7.3
Rodman*	7.1	24.8	21.9	24.8
Goose Cove (HILTS)		2.9	2.9	2.9
Schulze Cove	8.2		8.4	8.4
St. John Baptist*	7.6	13.1		
St. John Baptist S.				4.4
Nakwasina Passage				8.7
Noxon Creek*	2.9			2.9
Nakawsina (HILTS)	2.1			2.1
Lisa Creek*		5.4		
Lisa Creek NW	3.3			5.4
Total	35.5	51.9	38.8	66.9

Source: Allio 1995. * Previously used LTF site.

Long-term Productivity

This section compares the short-term effects of developing LTFs in the intertidal area to long- term accessibility (for timber management) and productivity in the area. Without salt water transportation, the long-term opportunity to manage the uplands for commercial timber is lost. It is assumed that other resources would have similar management opportunities with or without access to the uplands from salt water (by an LTF).

Off-Site Human Environment

Economics

Wood Products Industry

Each alternative will affect the number and composition of timber-related jobs in Southeast Alaska. To estimate the economic effects of the alternatives we assume that other factors affecting the wood products market remain constant. It is important to note, however, that the amount of timber offered for sale by this project is only one of many factors that ultimately determines employment in the region's wood products industry. Other factors which will influence employment are:

- The type of wood processing facilities available in the region.
- The supply, demand, and value of the products manufactured.
- Worker productivity.
- The amount of capital investment.
- The technology employed.
- Interest rates.
- Foreign exchange rates.
- Timber management decisions made by other forest owners.

The employment and income effects of the alternatives were estimated using the industry-wide average of 8.24 jobs per million board feet harvested. This figure was calculated by the Forest Service economic model IMPLAN (Table 4-47). The associated income effects were also calculated using coefficients generated by the IMPLAN model. The economic effects reported in Table 4-47 include direct and secondary effects. For purposes of this analysis we assume that the timber volume in the action alternatives would be offered in varying amounts over a four-year period. Harvest is assumed to occur during the year following the offering. Actual harvest may occur over a more extended time frame.

Table 4-47
Project Timber-Related Employment and Income by Alternative

Assumed Harvest Year	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
1997	43	57	55	72	0
1998	152	274	329	358	0
1999	53	54	0	74	0
2000	103	129	0	158	0
Average Annual Number of Jobs	88	129	96	166	0
Average Annual Earning $ millions	$3.7	$5.5	$4.1	$7.1	0

Timber harvested under the action alternatives will provide a source of wood to independent mills in operation throughout the region, or contribute to Forest Service contract obligations to the Ketchikan Pulp Company. This project alone will not be of sufficient duration to encourage investment in new facilities. The primary effect will be retention of existing employment levels.

The no action alternative (Alt. 5) could result in fewer timber-related jobs if regional mills are not able to purchase wood from another source.

Commercial Fishing Industry

Current standards and guidelines for timber harvest activities are expected to limit adverse effects on fish habitat and fish populations. Jobs in the fishing industry are not expected to change due to implementing any of the project alternatives.

Recreation and Tourism Industry

Recreation and tourism-related jobs, including employment related to sport hunting and fishing, are projected to change at the same rate as future use. During the 1990's recreational use in Southeast Alaska is expected to increase by 27 percent for general recreation and tourism, 36 percent for sport fishing, and 53 percent for hunting (Forest Service 1990). Implementation of any of the alternatives in the Northwest Baranof Project Area is not expected to significantly impact this trend.

Jobs and earnings related to money spent by recreationists are widely dispersed across Southeast Alaska. Recreationists will stop at nearby towns to replenish their groceries, gasoline, and other supplies. Most equipment and initial supplies, however, are purchased in their home communities. Employment and personal income generated by recreational use of the Northwest Baranof Project Area will be similarly dispersed. The recreational users having the primary economic impact will be individual recreationists, guides and outfitters and their clients, and tourists viewing the Project Area from cruise ships or from the Alaska Marine Highway ferry system.

Many places within the Northwest Baranof Project Area are seen by passengers of cruise ships and the Alaska Marine Highway. None of the alternatives is expected to effect visual resources to the extent that alterations of marine transportation routes or a decrease in the numbers of passengers would occur. Consequently, no measurable economic impact to waterborne tourism is expected under any of the proposed alternatives.

The 1994 Chatham Area Outfitter Guide Use Report indicates that a total of six big game guides used areas within or adjacent to the Project Area in 1994. Most of the guides accessed the area by boat. Further examination of the use records show that activity within the Project Area represented an average of 10 percent of the total activity for these six guides. Individual use of the area ranged from a low of 3 percent to a high of 25 percent of total reported activity. Two guides relied on the area for at least 20 percent of their business. The specific areas used by these guides include Fish Bay, Sitka Sound, Salisbury Sound, and Peril Strait narrows.

The report indicates the Project Area is not the primary hunting area of the big game guides who hold permits to hunt in the area. Of the specific locations reported, only Fish Bay lies completely within the Project Area. No harvest is proposed for Fish Bay under any of the alternatives. For these reasons we assume there would be only minimal economic impact to the outfitter/guide industry under any of the management alternatives.

Although the level of recreational activity that takes place in the Northwest Baranof Project Area is relatively high by Southeast Alaska standards, most activity is limited to those areas easily accessible by saltwater. In economic terms, no alternative is expected to significantly affect employment and income opportunities in the recreation and tourism industry. Implementation of any of the action alternatives may result in the displacement of recreational users to areas outside the Project Area. This displacement would be a result of recreationists seeking specific recreation opportunities that might no longer be available due to timber harvest or road construction. As more areas throughout Southeast Alaska are harvested for timber, recreationists seeking primitive or semiprimitive recreational opportunities would find it increasingly difficult to find places to recreate. This displacement, however, would not be expected to significantly change employment or income.

Community Economics

Differing degrees of resource availability will ultimately effect employment and income at the community level. Under all scenarios there will continue to be logging in Southeast Alaska. It is not possible, however, to determine the economic effects of the Northwest Baranof Project for specific communities because it is impossible to predict which and to what extent each community will benefit. Variables such as which mill successfully bids for the timber, which mill cuts back or closes, which mill remains open, and which logging company successfully competes for the available business are impossible to predict. Workers cross borough and state lines to work in the woods. Logs are hauled to other communities for processing. As their value increases, logs are likely to be hauled longer distances. Because of these factors the analysis of social, employment, and income effects by community is exceedingly complex. The presentation of effects at the community level would be speculative and misleading.

Social Values

All alternatives, including the no action alternative (Alternative 5), have social implications. What these impacts are and their magnitude varies by the point of view and value system of individuals and groups affected. Generally, people's perception of the significance of impacts decreases as geographic distance increases. The exception to this is when management activities appear to be based on broad public policies which are perceived to be morally wrong or which appear to destroy a resource which is irreplaceable. Swanson and Loomis (1993) highlight that all Americans place a high value on maintenance of viable ecosystems even when those systems are far removed from their homes. This implies that direct commodity production and forest use does not fully account for how society values or assigns the real costs of particular management options.

The Northwest Baranof Project Area is considered by many Sitka residents to be their "back yard" and, as such, is extremely important to them. The mix of values that Sitka residents want the Project Area to deliver are different from those of people from other areas. (i.e., if this timber was to go to the Wrangell mill, Wrangell residents may want the Project Area to deliver the maximum amount of saw timber. Sitka residents, however, do not want timber harvest to adversely affect their subsistence hunting and fishing.)

For the Northwest Baranof Project, we have attempted to strike a balance for delivering forest values to the public in all alternatives. We developed a reasonable range of alternatives using good science, and given the desires of the public, current policies, and political pressures. Each alternative delivers a broad array of forest values in varying degrees.

Tongass timber sale projects have historically had a variety of positive and negative effects on local communities. To communities dependent on the timber industry, these projects may be seen as beneficial to their way of life, with the guarantee of continued emloyment for their residents. To other communities more dependent on subsistence gathering, these projects may act as a hindrance to the day-to-day lives of their residents.

The Northwest Baranof Project may have an adverse effect on local subsistence and recreation patterns, mainly due to wildlife habitat modification, enhanced or restricted access, changes to the visual and aesthetic character of the area, and new competition from logging camp residents. On the other hand, the Northwest Baranof Project would have a positive effect on Sitka's economy if a small, local wood products industry were developed.

Alternative 4 would have the greatest positive impacts to a timber products industry and the greatest negative impacts to subsistence lifestyles and the tourism industry. Alternative 5, the no action alternative, would have the greatest positive impact to subsistence lifestyles and the tourism industry, but would not support a local or regional wood products industry.

Of the action alternatives, Alternative 3 would have the smallest negative impact to subsistence lifestyle because harvest activities are located north of Fish Bay and away from the subsistence areas closest to Sitka. Alternative 3 supplies the second lowest amount of wood to the timber industry.

Of the alternatives, Alternative 2 supplies the second largest amount of wood to the timber products industry. Although it would log a fair amount of area, it may be relatively acceptable to local subsistence hunters because it avoids logging in the locally termed "slaughter ridge" hunting area of Nakwasina Passage.

Although Alternative 1 harvests the least amount of timber of all the action alternatives, it spreads impacts throughout the Project Area. It is difficult to estimate if this would be considered positive or negative effect by subsistence hunters or the tourism industry.

Non-clearcut harvest methods are being considered in all action alternatives and are being called for in units in which clearcutting would be visually unacceptable. Silvicultural prescriptions, however, call for clearcutting in many units in each action alternative. This may not be acceptable to a number of local Sitkans who oppose all clearcut logging in the areas close to Sitka.

Other Environmental Considerations

Possible Adverse Environmental Effects that Cannot be Avoided

Implementation of any action alternative may result in some adverse environmental effects that cannot be effectively mitigated or avoided if the action is to take place. The Forest Service designed the interdisciplinary procedure used to identify specific harvest units and roads to eliminate or lessen the significant adverse consequences. In addition, we intend to further limit the extent, severity, and duration of these effects by applying standards and guidelines, BMPs, mitigation measures, and a monitoring plan. We discussed the specific environmental effects of the alternatives earlier in this chapter, and the proposed mitigation measures are discussed in Appendix A. Although we avoided potentially adverse environmental effects in the formulation of the alternatives, some adverse impacts to the environment which cannot be completely mitigated may occur.

We will implement standards and guidelines, BMPs, and monitoring plans which prevent significant adverse effects to soil and water. However, the potential for adverse impacts does exist. Sediment production would occur as long as roads are being built and timber is harvested. Sediment would be produced by surface erosion, channel erosion, and mass movement.

Disturbance, displacement, or loss of wildlife may occur as a consequence of habitat loss and increased human activity in the Project Area. New road construction and the human activities associated with new access to areas previously unroaded may result in impacts to wildlife. Improved access into areas that previously had limited roads would have similar effects. The proposed activities may increase competition for subsistence resources.

Ground-disturbing activities would temporarily increase sediment loads in some streams. This could displace fish, reduce anadromous and resident fish reproductive success, and alter aquatic invertebrate populations.

We would reduce both the amount and distribution of mature and old-growth stands through implementation of any action alternative. The rate and severity of adverse impacts varies by alternative. Because some wildlife species rely on habitat conditions provided by old-growth stands, we can expect a reduction in the populations of some wildlife species. As old-growth and mature timber stands are converted to young even-aged stands, the capability of the Project Area to provide optimal habitat for old-growth dependent species would be reduced.

Timber harvest and road construction in areas that are currently unroaded will alter natural characteristics of these areas. This will modify the recreational experiences that are offered by these areas. Both Primitive and Semiprimitive recreational opportunities will be lost by these actions.

The natural landscape will appear visually altered by timber harvest, particularly where logging activity is highly visible from travel routes. These adverse effects will eventually be reduced by growth of vegetation. Other impacts on the natural appearance of the

landscape include roads and structures which are highly visible despite efforts to blend them with land forms and mitigate the effect by landscaping.

The intensity and duration of these effects depend on the alternative and the mitigation measures applied to protect the resources. Most unavoidable effects are expected to be short term (usually less than two years). In all cases, the effects would be managed to comply with established legal limits, such as a maximum time for regeneration. To check and reduce these effects, monitoring procedures and mitigation measures have been planned for those areas which may be affected. Certain monitoring procedures and mitigation measures are required by existing standards or guidelines. Specific mitigation measures for each alternative are included in Chapter 2.

All alternatives would come under the mandate of the Multiple Use and Sustained Yield Act of 1960, which requires the Forest Service to manage National Forest lands for multiple uses (including timber, recreation, fish and wildlife, range, and watershed). All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be reestablished and grown again if the productivity of the land is not impaired.

Maintaining the productivity of the land is a complex, long-term objective. All alternatives protect the long-term productivity of the Project Area through the use of specific standards and guidelines, mitigative measures, and BMPs. Long-term productivity could change as a result of various management activities proposed in the alternatives. Timber management activities will have direct, indirect, and cumulative effects on the economic, social, and biological environment.

Soil and water are two key factors in ecosystem productivity, and these resources will be protected in all alternatives to avoid damage which could take many decades to rectify. Sustained yield of timber, wildlife habitat, and other renewable resources all rely on maintaining long-term soil productivity. Quality and quantity of water from the Project Area may fluctuate as a result of short-term uses, but no long-term effects to the water resource are expected to occur as a result of timber management activities.

Relationship Between Short-term Uses and Long-term Productivity

All alternatives would provide the fish and wildlife habitat necessary to maintain viable, well-distributed populations of existing native and desired nonnative vertebrate species throughout the Project Area. The abundance and diversity of wildlife species depend on the quality, quantity, and distribution of habitat, whether used for breeding, feeding, or resting. Management Indicator Species are used to represent the habitat requirements of all fish and wildlife species found in the Project Area. By managing habitats and populations of indicator species, the other species associated with the same habitat would also benefit. The alternatives provide standards, guidelines, and mitigation measures for maintaining long-term habitat and species productivity. The alternatives vary in the risk presented to both wildlife habitat and habitat capability.

Timber rotations are approximately 100 years. To ensure adequate production of timber, harvest has been scheduled to allow the earliest cut stands to mature into merchantable

timber before the planned harvest of original stands is complete. When the first rotation is complete, mature timber stands would be harvested again on a new rotation. Management of the timber resource on these rotations could affect long-term productivity, depending on the intensity of silvicultural practices. Projected timber rotation lengths are not anticipated to affect long-term productivity. Mitigation measures are planned under all the alternatives to ensure future availability of other renewable resources as well.

Opportunities for dispersed recreation use, including hiking, camping, fishing, hunting, and viewing the natural scenery, will be maintained and increased for future generations. The setting in which these activities occur varies by alternative, but the long-term potential for the Project Area to provide a spectrum of recreation opportunities would be maintained in all alternatives.

Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are decisions to use, modify, or otherwise affect nonrenewable resources such as cultural resources or minerals. It could also apply to resources renewable only over a long period of time such as soil productivity or old-growth forests. Such commitments of resources are considered irreversible because the resource has deteriorated to the point that renewal can occur only over a long period of time or at a great expense, or the resource has been destroyed or removed. All alternatives result in some irreversible commitments, although the extent and potential for adverse effects increase in alternatives which emphasize resource extraction and utilization.

Irretrievable commitments represent opportunities foregone for the period of the proposed actions, during which other resource utilization cannot be realized. These decisions are reversible, but the utilization opportunities foregone are irretrievable. Under multiple-use management, some irretrievable commitments of resources are unavoidable due to the mutually exclusive relationship between some resources. An example of such a commitment is development of logging camps and LTFs that will be removed at the completion of logging activities. These developments occupy approximately five to 10 acres and include bunkhouses, mobile homes, fuel storage facilities, etc. For the three to five years that such developments exist, the opportunity to otherwise utilize these areas is foregone, and thus irretrievable.

The irreversible disturbance of some types of cultural resources may occur as a consequence of management activities. This would be especially true for subsurface resources that cannot be located through surface surveys. Even with mitigation, unanticipated or unavoidable disturbances can result in the loss of cultural values. Mitigation efforts such as data recovery involve the scientific and controlled destruction of a cultural resource site. Once undertaken, the effects are irreversible and the mitigation effort becomes an irretrievable commitment to the resource.

The uses of energy resources and the removal of mineral resources are irreversible commitments of resources. The utilization of rock resources for road and facility construction is an example. The use of fossil fuels during project administration activities would be an irreversible resource commitment. Alternatives vary by the amount of

energy and mineral resources used; the No-Action Alternative abstains from the use of these nonrenewable resources at this time.

In unroaded areas, development activities such as timber harvest and the road construction associated with harvest will irreversibly reduce the potential amount of area that could be designated as a part of the National Wilderness Preservation System, managed as a Research Natural Area, or managed for other purposes requiring natural characteristics.

An irreversible loss occurs when forests of old-growth trees are harvested, fragmented, or removed for the construction of roads or other purposes. Old-growth stands provide key wildlife habitat and are also valued for ecological and aesthetic reasons. Because old-growth stands take more than 150 years to develop, the commitment of this resource to certain uses is reversible over a long period of time.

Some long-term uses of the land cause an irreversible loss of soil productivity. Examples of these uses include the establishment of arterial and collector roads and log transfer facilities.

Possible Conflicts with Plans and Policies of Other Jurisdictions

The regulations for implementing NEPA require a determination of possible conflicts between the proposed action and the objectives of Federal, State, and local land use plans, policies, and controls for the area. The major land use regulations of concern are the CZMA, Section 810 of ANILCA, and the State of Alaska's Forest Practices Act. A discussion of each of these determinations is presented below.

Coastal Zone Management Act of 1976 (CZMA)

The CZMA was passed by Congress in 1976 and amended in 1990. This law, as amended, requires Federal agencies conducting activities or undertaking development which effect the coastal zone to ensure that the activities or developments are consistent with approved State coastal management programs to the maximum extent practicable. The State of Alaska passed the Alaska Coastal Management Act in 1977 to establish a program that meets the requirements of the CZMA. It contains the standards and criteria for a determination of consistence for activities within the coastal zone.

The Alaska Coastal Management Program (ACMP), in turn, encourages local coastal communities to develop local policies that guide the development of coastal resources. The City and Borough of Sitka participates in the program and has established the Sitka Coastal Management Citizens Committee, of which the Forest Service is a member. The City and Borough has also developed the Sitka District Coastal Management Program, which has as its goal "... to achieve wise use of the land and water resources of the coastal area and to balance economic growth with ecological and cultural values, so as to maintain and protect Sitka's coastal resources for the beneficial use and enjoyment for present and future generations." The Northwest Baranof Project Area lies entirely within the boundary for the Sitka Coastal District.

Standards against which the consistency evaluation will take place are: Alaska Statute Title 46, Water, Air, Energy, and Environmental Conservation; Alaska Forest Practices Act of 1990; and the Sitka District Coastal Management Program.

The Forest Service has evaluated the alternatives to ensure that the activities and developments affecting the coastal zone are consistent with approved coastal management programs to the maximum extent practicable. The standards and guidelines for timber management activities in the Northwest Baranof Project Area meet or exceed those indicated in the Alaska Forest Practices Act and the Alaska Coastal Management Program.

Evaluation of the proposed activities against standards and requirements for activities within the coastal zone results in a finding that these activities are consistent with the Alaska Coastal Management Program to the greatest extent practicable. The Office of Governmental Coordination will do a consistency review of the preferred alternative.

Alaska National Interest Lands Conservation Act of 1980 (ANILCA)

Under Section 810 of ANILCA, agencies are required to evaluate the effects of proposed actions on subsistence uses of Federal land and to determine if the proposed action may significantly restrict subsistence opportunities. Refer to the *Subsistence* section of this chapter for the evaluation of impacts to subsistence use as a result of the alternatives.

State of Alaska's Forest Practices Act of 1990

On May 11, 1990, Governor Cowper approved the legislature's major revision of the State's Forest Practices Act. The revised act significantly increases the State's role in providing protection and management for important forest resources on State and private lands. The revised Forest Practices Act will also affect National Forest management through its relationship to the ACMP and the Federal CZMA (see above discussion).

For National Forest timber operations such as proposed for the Northwest Baranof Project, the effect of the revised Forest Practices Act is essentially two-fold. First, it clarifies that the revised Forest Practices Act is the standard which must be used for evaluating timber harvest activities on Federal lands for purposes of determining consistency, to the maximum extent practicable, with the Alaska Coastal Zone Management Program. Second, it calls for minimum 100-foot buffers on all Class I streams, and it recognizes that consistence to the maximum extent possible for purposes of the Alaska Coastal Management Program is attainable in Federal timber harvest activities, using specific methodologies which may differ from those required by the revised Forest Practices Act or its implementing regulations.

The Tongass Timber Reform Act (TTRA) prohibits commercial timber harvesting within buffer zones established on all Class I streams and those Class II streams which flow directly into Class I streams. Buffer zones have a minimum width of 100-feet horizontal distance from the edge of either side of the stream.

4 Environmental Consequences

Energy Requirements and Conservation Potential of Alternatives

The implementation of the proposed actions in the Northwest Baranof Project Area will require the expenditure of energy (e.g., fuel consumption). The amount of energy used varies by alternative based on timber volume harvested and miles of road constructed. The direct effect of the alternatives on energy requirements would be attributed to timber harvest, road construction, and travel necessary to administer the timber sale. Indirect energy requirements include processing wood products and the transport of the products to secondary processors and consumers. The estimated total fuel consumption required for each alternative is displayed in Table 4-48.

Table 4-48
Estimated Fuel Consumption (Millions of Gallons), by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Preparation and Administration (1.56 gallons/mbf)	0.08	0.08	0.06	0.10	0
Logging and Transportation (14.8 gallons/mbf)	0.30	0.29	0.21	0.41	0
Helicopter Logging (23.8 gallons/mbf)	0.36	0.77	0.59	0.94	
Road Construction and Maintenance (4,000 gallons/mile)	0.16	0.16	0.10	0.26	0
Total Consumption	0.88	1.30	0.96	1.70	0

*Note: Estimated fuel consumption based on consumption per mbf of sawlog volume.

Natural or Depletable Resource Requirements and Conservation of Alternatives

All alternatives considered in detail are designed to conform to applicable laws and regulations pertaining to natural or depletable resources, including minerals and energy resources. Regulation of mineral and energy activities on the National Forest, under the U.S. Mining Laws Act of May 1872 and the Mineral Leasing Act of February 1920, is shared with the Bureau of Land Management (BLM). The demand for access to National Forest lands for the purpose of mineral and energy exploration and development is expected to increase over time.

The action alternatives propose road construction that will increase opportunities for access to the National Forest within the Northwest Baranof Project Area. This increased access may result in increased activity with regard to potential mineral or energy resource occurrences.

Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment

The Northwest Baranof Project Area contains no urban areas or built-up areas of any kind. Therefore, the only applicable concern under this topic is with historic and cultural resources. The goal of the Forest Service's Cultural Resource Management Program is to preserve significant cultural resources in their field setting and ensure they remain available in the future for research, social/cultural purposes, recreation, and education. There are adequate standards, guidelines, and procedures to protect cultural resources and to meet the goals of the Cultural Resource Management Program. Cultural resources and the proposed project design are discussed in the *Heritage Resources* section of this chapter.

Effects of Alternatives on Consumers, Civil Rights, Minorities, and Women

All Forest Service actions have the potential to produce some form of impact, positive and/or negative, on the civil rights of individuals or groups, including minorities and women. The need to conduct an analysis of this potential impact is required by Forest Service Manual and Handbook direction. The purpose of the impact analysis is to determine the scope, intensity, duration, and direction of impacts resulting from a proposed action. For environmental or natural resource actions as proposed for the Northwest Baranof Project, the civil rights impact analysis is an integral part of the procedures and variables associated with the social impact analysis. This analysis is discussed in the *Economics* section of this chapter.

The effect of the alternatives on consumers is reflected in the discussion of the various goods and services supplied as a result of the proposed actions. This analysis occurs throughout this chapter as an integral part of the analysis of the effects on other components of the environment.

Effects of Alternatives on Prime Farm Land, Rangeland, and Forest Land

All alternatives are in keeping with the intent of Secretary of Agriculture Memorandum 1827 for prime land. The Project Area does not contain any prime farm lands or rangelands. Prime forest land does not apply to lands within the National Forest system. In all alternatives, lands administered by the Forest Service would be managed with a sensitivity to the effects on adjacent lands.

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Forest Service: 15 years

Pre-Construction Survey Crew Chief, Tongass NF, Chatham Area (6 yerars)
Pre-Sale Layout Crew Leader, Tongass NF, Chatham Area (2 years)
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B.S., Forest Resource Management, Humboldt State University, 1978
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Certified Silviculturist, Forest Service, Regions 6 and 10, 1989-present

Forest Service: 18 years

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Silviculturist, Rogue River NF, Prospect RD (2 years)
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Forestry, Humboldt State University, 1956-1960
Civil Engineering, Humboldt State University, 1960-1962
Civil Engineering, Los Angeles State, 1964-1966

Forest Service: 33 years

GIS Coordinator, Tongass NF, Chatham Area (4 years)
Planner, Tongass NF, Chatham Area (5 years)
Transportation Planner and Logging Engineer, Klamath NF (12 years)
Transportation Planner and Logging Engineer, Sequoia NF (4 years)
Survey Technician, Design Engineer, Angeles NF (4 years)
Survey Technician, Klamath NF (4 years)

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A.S., Natural Resources Conservation, State University of New York, 1975

Forest Service: 14 years

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Recreation Planner, Tongass NF, Chatham Area (1 year)
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Civil Engineering Technician, Nez Perce NF (9 years)
Civil Engineering Technician, Horse Creek Research Project, Nezperce NF and Intermountain Research Station (2 years)
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Forest Service: 13 years
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Soil Scientist, Chugach NF (5 1/2 years)
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Civil Engineer, Tongass NF (2 years)
Civil Engineer, Chugach NF (10 years)
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Forest Service: 15 years
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Biological Tech, Chugach NF, Cordova RD (3 years)
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Forest Service: 16 years
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- Eric Jordan, Sitka Committee
- Craig Loomis, Upper Lynn Canal Committee
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- Sam McBeen, Tenakee Springs Committee
- Gary McCullough, Petersburg Committee
- Pat Mills, Icy Straits Committee
- Patricia Phillips, Pelican Committee
- Charles Piercy, Ketchikan Committee
- Mim Robinson, Port Alexander Committee
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- Walter A. Soboloff, Executive Committee
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Alaska Native Sisterhood
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- Mayor
- Planning & Zoning Committee

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US Coast Guard, 17th District Office, Commanding Officer

US Coast Guard, Sitka Air Station, Commanding Officer
Kathy Veit, US Environmental Protection Agency, Chief Program Coordination Branch
Dave Milne, US Helilog
Jed Parkinson, USDA Forest Service, SO, Engineer/Roads
USDI National Park Service, Sitka National Historical Park
David Ford, Western Forest Industries Assn.
Eric Huggans, Western States Corp.
Warren C. Pellet, Jr., White Pass Alaska
James King, Wildlife Alaska Society
Don McKenzie, Wildlife Management Institute
Wrangell Chamber of Commerce
Rick Klinke, Wrangell Forest Products Ltd.

Organizations Receiving the Complete Review Copy of the EIS

Alaska Dept of Commerce & Econ Develop,
- Division of Economic Development
- Office of the Commissioner

Alaska Dept of Community & Regional Aff, Office of the Commissioner

Alaska Dept of Environ Conservation,
- Division of Environmental Quality
- Office of the Commissioner
- Public Information Office
- James Clare, Sitka District Office
- Program Coordinator, SE Regional Office

Alaska Department of Fish and Game:
- Division of Commercial Fisheries
- Division of Sport Fish
- Division of Subsistence
- Division of Wildlife Conservation
- Office of the Commissioner
- Sitka Office, Sport Fish Division
- Sitka Office, Wildlife Conservation
- Dave Hardy, Sitka Office, Habitat Division
- Ron Josephson
- Lana Shea, Division of Habitat

Alaska Dept of Natural Resources
- Division of Forestry
- Division of Land
- Division of Parks & Outdoor Rec
- Division of Water
- Office of the Commissioner
- State Historic Preservation Officer
- Marlys E. Tedin, Sitka State Parks Advisory Board

Director , Alaska Office of Management & Budget, Div. of Governmental Coordination
Lorraine Marshall, Alaska Office of Management & Budget, Div. of Governmental Coordination
Christine Valentine, Alaska Office of Management and Budget, Project Review Coordinator
Charles Johnson, Alaska Biological Research, Inc.

Chuck Oliver, Alaska Pulp Corp.
Alaska Pulp Corp., Woods Division
Brian Brown, Alaska Pulp Corp., Woods Division, Engineer

Ralph Fenner, Alaska Pulp Corp., Woods Division, Log Department Supervisor
George S. Woodbury, Alaska Pulp Corp., Woods Division, Timber Operations, Vice President
Alaska Pulp Corporation, Hoonah Field Office
Frank Ropell, Alaska Pulp Corporation
Robert Allen, Allen Marine, Inc.
American Rivers
Angoon Public School Library
Larry Edwards, Baidarka Boats
Michael H. Trotter, Beyond Boundaries Expedition
Avrum Gross, Chatham Cannery, Ltd.
Marlene Campbell, City & Borough of Sitka, ACMP Coordinator
City of Angoon
Daniel Johnson, Jr., City of Angoon, Mayor
George Johnson, Jr., City of Angoon, ACMP Coordinator
City of Tenakee Springs
Louis Heins, City of Tenakee Springs, Mayor
City of Wrangell
Craig Public Library
Douglas Public Library
Judith Schneider, Ebasco Environmental
Elfin Cove Public Library
Federal Energy Regulatory Commission, Advisor on Environmental Quality
Forestry Sciences Laboratory, Juneau Office
Friends of the Earth
Mike Holloway, Friends of the Earth
Greenpeace
Gustavus Public Library
Haines Public Library
Hollis Public Library
Hoonah Public Library
Hyder Public Library
Michael Galginaitis, Impact Assessment, Inc.
Juneau Public Library
News Director, KCAW-Raven Radio
Kake Community Library
Kasaan Community Library
Ketchikan Public Library
Kettleson Memorial Library
Frank Sharp, Kootznoowoo, Inc., President
Ilene Brooks, LJL Alaska Research
Joris Naiman, Lewis and Clark College, Northwestern Law School
June Christle, Logger's Legal Defense Fund
Vivian Menaker, Lynn Canal Conservation, Inc.
Mendenhall Valley Public Library
Pelican Public Library
Petersburg Public Library
James F. Clark, Robertson, Monagle & Eastaugh
Del Cesar, SE Alaska Regional Health Corp.
John Sisk, SEACC, Executive Director
Leo Barlow, Sealaska Corporation
Arlene G. Dilts, Sealaska Corporation
Robert W. Loescher, Sealaska Corporation, Resource Management
Bradley L. Shaffer, Shaffer & Harrington
Sheldon Jackson College, Stratton Library
Tom Waldo, Sierra Club Legal Defense Fund
Dick Buhler, Silver Bay Logging
Sitka Chamber of Commerce

Brian McMitt, Sitka Conservation Society
Skagway Public Library
Patrick A. Soderberg, Soderburg Logging & Const.
Bob Meyer, Southeast Marine
Harold Martin, Southeast Native Subsistence Comm., c/o Tlingit & Haida Central Council
Tenakee Springs Public Library
Territorial Sportsmen, Inc.
Michael McIntosh, The McIntosh Foundation
Thorne Bay Community Library
US Advis. Council on Historic Pres., Office of Program Review & Education
US Army Corps of Engineers, Headquarters, Attn: DAEN-ZCE
US Army Corps of Engineers, Regulatory Branch, Copy #1
US Army Corps of Engineers, Regulatory Branch, Copy #2
US Coast Guard, EI Branch, Copy #1, Marine Environ. & Protect. Division
US Coast Guard, EI Branch, Copy #2, Marine Environ. & Protect. Division
US Department of Commerce, NOAA, Ecology & Conservation Office
Steve Pennoyer, US Department of Commerce, NOAA, National Marine Fisheries Service
US Department of Interior
US Department of Interior, Office of Environmental Affairs
US Environmental Protection Agency, Alaska Operations Office
US Environmental Protection Agency, EIS Review Coordinator, Region X
US Environmental Protection Agency, Office of Environmental Review
SupervisorUS Fish & Wildlife Service
Carol Hale, US Fish & Wildlife Service
Nevin Holmberg, US Fish & Wildlife Service, Field Supervisor
Susan Walker, US Fish & Wildlife Service, Fisheries Division

USDA Forest Service
- Admiralty National Monument
- Alaska Region Public Affairs
- Hoonah Ranger District
- Information Center, Centennial Hall
- Juneau Ranger District
- Office of Environmental Coordination
- Tongass NF, Ketchikan Area
- Tongass NF, Stikine Area
- Wrangell Ranger District
- Yakutat Ranger District
- Alaska Region, Planning, Programming and Budgeting

USDA National Agricultural Library, Acquisition & Serial Branch
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Jack Kruse, Dr., University of Alaska, Anchorage, Institute of Soc. & Econ. Research
W.R. Tonsgard, W.R. Tonsgard Logging
Martin Weinstein, Weinstein Consulting Services
Whitestone Logging Co.
World Wildlife Fund
Wrangell Public Library

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Glossary

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ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ANCSA	Alaska Native Claims Settlement Act of 1971
ANILCA	Alaska National Interest Lands Conservation Act of 1980
BMP	Best Management Practice
CFL	Commercial Forest Land
CFR	Code of Federal Regulations
COE	Army Corps of Engineers
CZMA	Coastal Zone Management Act of 1976
DBH	Diameter at Breast Height
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FSH	Forest Service Handbook
GIS	Geographic Information System
GMU	Game Management Unit
HILTS	Helicopter Insertion Log Transfer Site
IDT	Interdisciplinary Team
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris
mbf	One thousand board feet
mmbf	One million board feet
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act of 1969 (as amended)
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
ORV	Off Road Vehicle
RMO	Road Management Objective
ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Officer
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
VCU	Value Comparison Unit
WAA	Wildlife Analysis Area

Alaska National Interest Lands Conservation Act (ANILCA)

Passed by Congress in 1980, this legislation designated 14 National Forest wilderness areas in Southeast Alaska. In section 705(a) Congress directed that at least $40,000,000 be made available annually to the Tongass Timber Supply Fund to maintain the timber supply from the Tongass National Forest at a rate of 4.5 billion board feet per decade. Section 810 requires evaluations of subsistence impacts before changing the use of these lands.

Alaska Native Claims Settlement Act (ANCSA)

Approved December 18, 1971, ANCSA provides for the settlement of certain land claims of Alaska Natives and for other purposes.

Allowable Sale Quantity (ASQ)

ASQ refers to the maximum quantity of timber that may be sold each decade from the Tongass National Forest. This quantity expressed as a board foot measure is calculated per timber utilization standards specified in the Alaska Regional Guide, the number and type of acres available for timber management, and the intensity of timber management. The ASQ was calculated at 4.5 billion board feet per decade for the Tongass National Forest.

Alpine/Subalpine Habitat

The region found on a mountain peak above 1,500-foot elevation.

Anadromous Fish

Anadromous fish spend part of their lives in fresh water and part of their lives in salt water. Anadromous fish include pink, chum, coho, sockeye, and king salmon, and steelhead trout. There are also anadromous Dolly Varden char.

Arterial Road

A forest road that provides service to large land areas and usually connects with other arterial roads or public highways.

Beach Fringe Habitat

Habitat that occurs from the intertidal zone inland 500 feet, and islands of less than 50 acres.

Benthic Habitat

Refers to the substrate and organisms on the bottom of marine environments.

Best Management Practice

A practice or combination of practices that, after problem assessment, examination of alternative practices, and appropriate public participation is determined by a state to be the most effective and praticable means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. A BMP is not a site-specific prescription but an action-initiating mechanism which eventually leads to the interdisciplinary development of a site-specific prescription.

Buffer

Tongass Timber Reform Act requires that timber harvest be prohibited in an area no less than 100 feet in width on each side of all Class I streams and Class II streams which flow directly into Class I streams. This 100-foot area is known as a buffer.

Candidate Species

Those species of plant or animal which are under consideration (by US Fish and Wildlife Service and National Marine Fisheries Service) for listing as threatened or endangered but which are provided no statutory protection under Endangered Species Act.

Category 2 Species

One of three categories of Candidate Species. Category 2 are those for which there is information indicating the species might qualify for endangered or threatened status.

Clearcut

A method of regeneration cutting in which the old crop is completely cut in designated patches. Regeneration in the Alaska Region is usually natural, and the size of the clearcut area rarely exceeds 100 acres.

Collector Road

A forest road that serves smaller land areas than an arterial road. Usually connects forest arterial roads to forest local roads or terminal facilities. Collector roads are usually long term facilities.

Commercial Fishery

Fish shellfish or other fishery resources taken or possessed within a designated area for commercial purposes.

Commercial Forest Land (CFL)

Productive forest land that is producing or capable of producing crops of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. This includes areas suitable for management and generally capable of producing in excess of 20 cubic feet per acre of annual growth or in excess of 8,000 board feet net volume per acre. It includes accessible and inaccessible areas.

Standard CFL: Timber that can be economically harvested with locally available logging systems such as highlead or short-span skyline.
Nonstandard CFL: Timber that cannot be harvested with locally available logging systems and would require the use of other logging systems such as helicopter or longspan skyline.

Conveyance

The passing of the title of a property from one owner to another.

Cruise

Refers to the general activity as opposed to a specific method of determining timber volume and quality.

Cumulative Effects

Cumulative effects are the impacts on the environment resulting from the addition of the incremental impacts of past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions occurring over time.

Direct Employment

The jobs that are immediately associated with the Long-Term Contract timber sale including for example logging sawmills and pulp mills.

Draft Environmental Impact Statement

Section 102 of the National Environmental Policy Act (NEPA) requires that a statement of environmental effects for a major Federal action be released to the public and other agencies for comment and review prior to a final management decision.

Ecological Approach

Natural resource planning and management activities that assure consideration of the relationship between all organisms (including humans) and their environment.

Ecological Process

The actions or events that link organisms (including humans) and their environment, such as disturbance, successional development, nutrient cycling, carbon sequestration, productivity, and decay.

Ecosystem

Living organisms interacting with each other and with their physical environment, usually described as an area for which it is meaningful to address these interrelationships.

Ecosystem Management

The use of an ecological approach that blends social, physical, economic and biological needs and values to assure productive, healthy ecosystems.

Endangered Species

A species of plant or animal which is in danger of extinction throughout all or a significant portion of its range.

Estuary Fringe Habitat

A 1,000-foot zone around an estuary.

Estuary

For the purpose of this EIS process estuary refers to the relatively flat intertidal and upland areas generally found at the heads of bays and mouths of streams. They are predominantly mud and grass flats and are unforested except for scattered spruce or cottonwood.

Even-Aged Management

The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. Clearcutting is an example of this type of management.

Existing Visual Condition (EVC)

The level of visual quality or condition presently occurring on the ground. The six existing visual condition categories are:

- Type I: These areas appear to be untouched by human activities.
- Type II: Areas in which changes in the landscape are not noticed by the average person unless pointed out.
- Type III Areas in which changes in the landscape are noticed by the average person but they do not attract attention. The natural appearance of the landscape still remains dominant.
- Type IV: Areas in which changes in the landscape are easily noticed by the average person and may attract some attention. Although the change in landscape is noticeable it may resemble a natural disturbance.
- Type V: Areas in which changes in the landscape are obvious to the average person These changes appear to be major disturbances.
- Type VI: Areas in which changes in the landscape are in glaring contrast to the natural landscape. The changes appear to be drastic disturbances.

Fish Habitat

The aquatic environment and the immediately surrounding terrestrial environment that combined afford the necessary physical and biological support systems required by fish species during various life stages.

Floodplain

The lowland and relatively flat areas joining inland and coastal waters including debris cones and flood-prone areas of offshore islands; including at a minimum that area subject to a 1 percent (100-year recurrence) or greater chance of flooding in any given year.

Forbs

Any herb that is not a grass or is not grasslike.

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)

Amended in 1976 by the National Forest Management Act.

Forested Habitat

All areas with forest cover. Used in this EIS to represent a general habitat zone.

Geographic Information System (GIS)

GIS is an information processing technology to input, store, manipulate, analyze, and display spatial and attribute data to support the decision making process. It is a system of computer maps with corresponding site specific information that can be electronically combined to provide reports and maps.

Habitat Capability

The number of healthy animals that a habitat can sustain.

Healthy Ecosystem

An ecosystem in which structure and functions allow the maintenance of biological diversity, biotic integrity, and ecological processes over time.

Heritage Resources

Historic or prehistoric objects, sites, buildings, structures, and so on that result from past human activities.

Incidental Ue Sites

LTF and camp sites where use of log transfer is expected to occur only once or twice over a 60 to 100 year period. Timber volumes at a site will normally not exceed 5 to 10 MMBF. Log sorting areas are normally not constructed and native log structures are expected. Typically the focus is on salvage of logs as a result of blowdown, disease, or harvest of isolated stands of timber. The lands involved are generally not accessible by alternative means. Floating camp operations are the norm.

Indirect Employment

The jobs in service industries that are associated with the Long-Term Contract timber sale including for example suppliers of logging and milling equipment.

Interdisciplinary Team (IDT)

A group of people with different backgrounds assembled to solve a problem or perform a task.

Intermittent Use Sites

LTF and camp sites where use is expected to vary from O to 17 MMBF per year. This operation can be described as having a "single side" (one full yarding and supporting system). These sites were described and analyzed by Sedlak in his analysis of alternative log transportation systems. Typically these sites will vary in use in a pattern of 4 MMBF for the first year, 11 to 17 MMBF for three years, 4 MMBF for the final year and a 6 to 15 year period with no log transfer. Timber volume from intermittent use would be at the average annual rate of about 3 to 5 MMBF per year over a 20 to 50 year period. Timber salvage operations may occur in the periods between major operations. Sort yards are not normally constructed if water storage sites are available. Year-round camp operation is generally not expected. Land-based camps have been common in the past, but increased use of floating camps has been observed at these sites.

Knutsen-Vandenberg Act (KV)

This Act was passed by Congress in 1930 and amended in 1976 to provide for reforestation, resource protection, and improvement projects in timber sale areas. These funds are collected as a portion of the stumpage fee paid by the purchaser. Examples of such projects are stream bank stabilization, fish passage structures, and wildlife habitat improvement.

Land Use Designation (LUD)

The method of classifying land uses presented in the Tongass Land Management Plan (TLMP). Land uses and activities are grouped to define along with a set of coordinating policies a compatible combination of management activities. The following is a description of the four classifications:

- LUD I: Wilderness areas.
- LUD II These lands are to be managed in a roadless state in order to retain their wildland character, but this designation would permit wildlife and fish habitat improvement as well as primitive recreation facility and road development under special authorization.
- LUD III: These lands may be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complimentary manner to provide the greatest combination of benefits.
- LUD IV: These lands provide opportunities for intensive resource use and development where the emphasis is primarily on commodity or market resources.

Landscape

An area composed of interacting ecosystems that are repeated because of geology, land form, soils, climate, biota and human influences throughout the area. Landscapes are generally of a size, shape and pattern which is determined by interacting ecosystems.

Large Woody Debris (LWD)

Any large piece of relatively stable woody material having a least diameter of greater than 10 centimeters and a length greater than one meter that intrudes into the stream channel.

Layout

Planning and mapping (using aerial photos) of harvest and road systems needed for total harvest of a given area.

Local Road

A forest road that connects termina facilities with forest collector, forest arterial or public highways. Usually forest local roads are single purpose transportation facilities and can either be long or short term in nature.

Log Transfer Facility (LTF)

A facility that is used for transferring commercially harvested logs to and from a vessel or log raft or the formation of a log raft. It is wholly or partially constructed in waters of the United States and siting and construction are regulated by the 1987 Amendments to the Clean Water Act. Formerly termed terminal transfer facility.

Long-term Road

Roads developed and operated to provide either continuous or intermittent access for long-term land management and resource utilization needs.

Management Area

An area one or more VCUs in size for which management direction was written in the Tongass Land Management Plan.

Management Indicator Species (MIS)

The following categories were used where appropriate: endangered and threatened plant and animal species identified on State and Federal lists; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; nongame species of special interest; additional plant or animal selected because their population changes are believed to indicate effects of management activities on other species of a major biological community or on water quality.

Mitigation

These measures include avoiding an impact by not taking a certain action or part of an action, minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during he life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

National Environmental Policy Act (NEPA)

Passed by Congress in 1969, NEPA declared a national policy to encourage productive harmony between humans and their environment to promote efforts that will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of humans to enrich the understanding of the ecological systems and natural resources important to the nation and to establish a Council on Environmental Quality. This act requires the preparation of environmental impact statements for federal actions that are determined to be of major significance.

National Forest Management Act (NFMA)

A law passed in 1976 that amends the Forest and Rangeland Renewable Resources Planning Act and requires the preparation of Forest plans.

Nonforest Land

Land that has never supported forests and lands formerly forested but now developed for nonforest uses or land with less than 10 percent cover of commercial tree species.

Notice of Intent (NOI)

Notice of Intent was submitted to indicate an intention to produce this EIS on March 1, 1990.

Occasional Use Sites

LTF and camp sites where intensive log transfer is expected for only 4 to 6 years out of a 20-to-30-year period. These sites have not been analyzed in the literature. The use pattern is expected to be cyclical through the life of the site. Timber volumes from major activities would be at the average annual rate of 1 to 2 MMBF per year over a 20 to 50 year period. Small timber operations will occur during the periods when major sale activities do not occur. Sort yards are constructed only if no other options are available. Floating camp operations are the expected normal situation unless commuting of workers from an established camp is feasible.

Old-Growth Forest

Old-growth stands are characterized by trees well past the age of maturity (dominant trees exceed 300 years in age). Stands exhibit declining growth rates and signs of decadence such as dead and dying trees snags and downed woody material. Stands include trees of all ages, multilayered canopies, a range of tree diameter sizes (including very large diameter trees up to and exceeding 3 meters), and the notable presence of understory vegetation. Old growth stands are defined in the TLMP inventory as those stands having the majority of timber volume in trees more than 150 years of age.

Operating Plan

Five-year plan for logging, road construction, and related activities under Federal Government contract with the APC.

Overstory

In a stand with several vegetative layers the overstory is the uppermost layer usually formed by the tallest trees.

Pole/Young Sawtimber Stage

The stage following timber harvest when canopy closure decreases the amount of light that reaches the forest floor and is associated with a rapid reduction in understory biomass. Usually 26 to 150 years.

Potential Yield

The potential yield for the next ten years is the maximum harvest that is possible given the optimum perpetual sustained-yield harvesting level attainable with intensive forestry on regulated areas and considering productivity of the land, conventional logging technology, standard silvicultural treatments, and relationships with other resource uses and the environment.

Practicable

This term means the LTF is available and capable of being constructed after taking into consideration costs, existing technology, and logistics in light of overall project purposes (40 CFR 230.3(q)). Such an analysis of LTF sites would include consideration of the intensity of site use, duration of site use, and the physical and biological characteristics of the site.

Precommercial Thinning

The practice of removing some of the trees of less than marketable size from a stand in order to achieve various management objectives.

Productive

The ability of an area to provide goods and services and to sustain ecological values.

Recreation Places

Identified geographic areas having one or more physical characteristics that are particularly attractive to people engaging in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.

Recreation Sites

Specific locations used for recreational activities such as a specific anchorage, campsite or trail. There may be one or more recreation sites within a recreation place.

Resident Fish

Fish that are not anadromous and that reside in fresh water on a permanent basis. Resident fish include non-anadromous Dolly Varden char and cutthroat trout.

Resilience

The ability of an ecosystem to maintain diversity, integrity and ecological processes following disturbance.

Restoration

Actions taken to modify an ecosystem in whole or in part to achieve a desired condition.

Riparian

Areas immediately adjacent to a body of water the vegetation of which is usually influenced by the water.

Road Management Objective (RMO)

Defines the intended purpose of an individual road based on Management Area direction and access management objectives. Road management objectives contain design criteria, operation criteria and maintenance criteria. Long-term and short-term roads have RMOs.

Roads, Specified

A road including related transportation facilities and appurtenances shown on the Sale Area Map and listed in the Timber Sale Contract.

Roads, Temporary

For National Forest timber sales temporary roads are constructed to harvest timber on a one-time basis. These logging roads are not considered part of the permanent forest transportation network and have stream crossing structures removed erosion measures put into place, and the road closed to vehicular traffic after harvest is completed.

Second-Growth Forest

Even-aged stands that will grow back on a site after removal of the previous timber stand.

Seedling/Sapling Stage

The stage following timber harvest when most of the colonizing tree and shrub seedlings become established. Usually 1 to 25 years.

Sensitivity Level

The measure of people's concern for the scenic quality of the National Forests. In 1980 the Tongass National Forest assigned sensitivity levels to land areas viewed from boat routes and anchorages plane routes, roads trails, public use areas, and recreation cabins.

- Level 1: Includes all seen areas from primary travel routes use areas and water bodies where at least three-fourths of the forest visitors have a major concern for scenic quality .
- Level 2: includes all seen areas from primary travel routes, use areas, and water bodies where at least one-fourth of the forest visitors have a major concern for scenic quality.
- Level 3: Includes all seen areas from secondary travel routes, use areas, and water bodies where less than one-fourth of the forest visitors have a major concern for scenic quality .

Silviculture

Forest management practices that deal with the establishment, development, reproduction, and care of forest trees.

Short-Term Road

Roads developed and operated for a limited time period but which are likely to be extended during a future entry and which cease to exist as a transportation facility after the purpose for which they were constructed is completed. These rods are considered part of the Forest transportation network.

Slash

Debris left over after a logging operation i.e. limbs, bark, broken pieces of logs.

State Historic Preservation Officer (SHPO)

State appointed official who administers Federal and State programs for cultural resources.

Stewardship

Caring for land and associated resources and passing healthy ecosystems to future generations.

Subsistence Use

The term subsistence use means the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing, for personal or family consumption; and for customary trade.

Successional Stage

One stage in a series of changes affecting the development of a biotic community. On its path to a climax stage the community will pass through several stages of adaptation to environmental changes.

Sustainability

The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

Tentatively Suitable Forest Land

Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

Thousand Board Foot Measure

A method of timber measurement in which the unit is equivalent to 1000 square feet of lumber one inch thick. It can be abbreviated mbf.

Threatened Species

A species of plant or animal which is likely to become an endangered species within the forseeable future throughout all or a significant portion of its range.

Timber Appraisal

Establishing the fair market value of timber by taking the selling value minus manufacturing costs, the cost of getting logs from the stump to the manufacturer, and an allowance for profit and risk.

Timber Entry

A term used to refer to how far into the timber rotation an area is on the basis of acreage harvested. For example, if an area is being managed for 3 entries over a 100-year rotation, the first entry would be completed when one-third (approximately 33 percent) of the available acreage is harvested (usually in 30-40 years); the second entry would be completed when two-thirds (approximately 66 percent) of the available acreage is harvested (usually 60-70 years); the third entry would be completed when all of the available acreage is harvested (at the end of the rotation).

Tongass Land Management Plan (TLMP)

The 10-year land allocation plan for the Tongass National Forest that directs and coordinates planning and the daily uses and activities carried out within the forest. See also Land Use Designation.

Turbidity

A measure of suspended sediments.

Understory

Anything growing in a stratum definitely below the main crown canopy.

Understory-Colonization Stage

The stage following timber harvest when most of the colonizing tree and shrub seedlings become established. Usually 1 to 25 years.

Uneven-Aged Management

The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provde a sustained yield of forest products. Group and individual tree selection are examples of this type of management.

Value Comparison Unit (VCU)

These areas which generally encompass a drainage basin were established in the Tongass National Forest to provide a common set of areas where resource inventories could be conducted and resource interpretations made.

Visual Quality Level (VQL)

VQLs are the level of visual quality that would result from the implementation of each alternative, expressed in the same terms as the VQOs, e.g., Retention, Partial Retention, Modification, Maximum Modification.

Visual Quality Objective (VQO)

Measurable standards reflecting five different degrees of landscape alteration based upon a landscape's diversity of natural features and the public's concern for high scenic quality. The five categories of VQOs are:

- Preservation: Permits ecological changes only. Applies to wilderness areas and other special classified areas.
- Retention: Provides for management activities that are not visually evident; requires reduction of contrast through mitigation measures either during or immediately after operation.
- Partial Retention: Management activities remain visually subordinate to the natural landscape. Mitigation measures should be accomplished within one year of project completion.
- Modification: Management activities may visually dominate the characteristics landscape. However activities must borrow from naturally established form line color and texture so that its visual characteristics resemble natural occurrences within the surrounding area when viewed in the middleground distance.
- Maximum Modification: Management activities may dominate the landscape. Mitigation measures should be accomplished with five years of project completion.

Volume

Stand volume based on standing net board feet per acre by Scribner Rule.

Volume Class

Volume class strata are used to describe the average volume of timber per acre in thousands of board feet (MBF). Following are the volume class strata and the range of volume each contains.

- Volume Class Strata 3: Less than 8 MBF/acre (cleared land seedlings or pole timber stands).
- Volume Class Strata 4: 8 to 20 MBF/acre.
- Volume Class Strata 5: 20 to 30 MBF/acre.
- Volume Class Strata 6: 30 to 50 MBF/acre.
- Volume Class Strata 7: 50+ MBF/acre.

V-notch

A V-shaped stream channel generally on steep mountainous terrain.

Watershed

The drainage area of a stream.

Wetland

Those areas that are inundated by surface or groundwater frequently enough to support vegetation that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wilderness

An area established by the Federal Government and administered either by the Forest Service National Park Service Fish and Wildlife Service or Bureau of Land Management in order to conserve its primeval character and influence for public enjoyment under primitive conditions in perpetuity.

Wildlife Analysis Area (WAA)

Alaska Department of Fish and Game administrative designation of and area that includes one or several Value Comparison Units (VCUs) for the purpose of regulating wildlife populations and reporting harvests.

Wildlife Habitat

The locality where a species may be found and where the essentials for its development and sustained existence are obtained.

Windthrows

Areas where trees are uprooted, blown down, or broken off by storm winds.

Spelling of Tlingit Clan Names in this Environmental Impact Statement

The spelling of Tlingit Clan names in this Environmental Impact Statement is based on two sources. The first is the current standard alphabet devised by Constance Naish and Gillian Story in the 1960s and was revised by Jeff Leer and Nora Marks Florendo Dauenhauer in 1972 with the consent of Ms. Naish and Ms. Story. This is the same alphabet that is used in the Tlingit Verb Dictionary (Story and Naish 1973), the Tlingit Noun Dictionary (Story and Naish 1976), the Tlingit Spelling Book (Dauenhauer and Dauenhauer 1984), and in all school programs in Alaska. This spelling is used in the text of this EIS.

The second source is Alaska Department of Fish and Game, Division of Subsistence technical papers on the harvest and use of fish and wildlife by residents of various Southeast Alaska communities. ADF&G utilized various historical standards for spelling on maps showing historic Tlingit Clan hunting boundaries. These maps are reproduced in the Chapter 3, Subsistence.

The following gives current standard spelling for specific Tlingit clan names and the ADF&G spelling for each map showing historic Tlingit clan hunting boundaries.

	Current Standard	ADF&G
Angoon Clans	Aanxaakitaan	Anqakitan
	Deisheetaan	Decitan
	Dakl'aweidi	Daklawedi
	Kak'weidl	Kaukwedi
	Teikweidi	Teokwedi
	Wooshkeetaan	Wuckitan
Hoonah Clans	Chookaneidi	Chukanei Dee´
	Takdeintaan	T'akdeintaan
	Wooshkeetaan	Woosh Ki Taan
Sitka Clans	Chookaneidi	Tcukanedi
	Kaagwaantaan	Kagwantan
	Kiks.adi	Kiks'adi
	L'uknax.adi	Luqnaxadi
	T'akdeintaan	Dak'dentan

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